FLYING

DECEMBER, 1944

VOLUME 35 • NUMBER 6

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America's World Air Routes ..... Charles Wilson 32

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CAL-AERO
TECHNICAL INSTITUTE
is the new name of
CURTISS WRIGHT TECHNICAL INSTITUTE

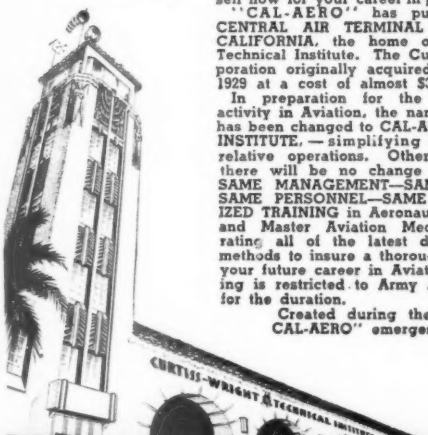
MAJOR C. C. MOSELEY, PRES. SINCE 1929

GRAND CENTRAL AIR TERMINAL .... GLENDALE 1, CALIFORNIA

SINCE 1929--THE BEST TO BE HAD IN SPECIALIZED TRAINING--FOR YOUR

AVIATION CAREER

Never was it more opportune for you to get into Aviation! Its future is clear, definite, assured. Military air transport lines have proven the airplane to be an indispensable factor. AMERICA IS GOING TO FLY—for pleasure, for business, for commerce. Prepare yourself now for your career in post-war aviation.



"CAL-AERO" has purchased GRAND CENTRAL AIR TERMINAL in GLENDALE, CALIFORNIA, the home of Curtiss-Wright Technical Institute. The Curtiss-Wright Corporation originally acquired this airport, in 1929 at a cost of almost $3,000,000.

In preparation for the great post-war activity in Aviation, the name of this school has been changed to CAL-AERO TECHNICAL INSTITUTE, — simplifying and coordinating relative operations. Other than in name, there will be no change in the school.— SAME MANAGEMENT—SAME LOCATION— SAME PERSONNEL—SAME FINE SPECIALIZED TRAINING in Aeronautical Engineering and Master Aviation Mechanics, incorporating all of the latest developments and methods to insure a thorough foundation for your future career in Aviation. Flight training is restricted to Army Air Force Cadets for the duration.

Created during the war, the name CAL-AERO" emerges symbolic of the highest standards in Aviation training. With an unmatched and unparalleled record of efficiency and safety in training more than 20,000 pilots for the Army Air Forces, together with this school's record of training 7,500 ground-crew men, at the same time, graduating thousands of civilians for the production front; these schools under the personal direction of Major C. C. Moseley since 1929, have been highly honored by citations for distinguished service in training men for the Army Air Forces.

In view of the co-related activities of these two schools in Aviation, with their honored record of war effort, it is but natural in planning, for the post-war period, that the technical phase of Aviation training should come under the distinguished name of "CAL-AERO". It will continue as heretofore, since 1929, under the personal direction of Major C. C. Moseley, on its own airport,— Grand Central Air Terminal in the heart of Southern California's giant aircraft industry.

As a result, CAL-AERO TECHNICAL INSTITUTE, with its honored war record and continuous service of training civilian students since 1929, emerges larger, stronger and finer than ever before. Civilian students have continued to enroll into this school during the war from many states and foreign nations, despite the difficulties of wartime travel. Returning service men, anxious to fit themselves for an outstanding place in post-war Aviation, likewise are enrolling upon discharge.

And so, as this distinguished old school of Aeronautics enters the post-war era, it does so with a distinguished new name,—CAL-AERO TECHNICAL INSTITUTE—a name that, in the supreme test of war has come to signify a new standard in Aviation training.

THIS TOWER OVERLOOKS AVIATION'S MOST DISTINGUISHED SCHOOL OF AERONAUTICS

CAL-AERO TECHNICAL INSTITUTE

FORMERLY CURTISS-WRIGHT TECHNICAL INSTITUTE

GRAND CENTRAL AIR TERMINAL
1225 AIRWAY, GLENDALE 1, CALIFORNIA
(LOS ANGELES COUNTY)

UNDER PERSONAL SUPERVISION OF MAJOR C. C. MOSELEY, PRESIDENT AND FOUNDER, SINCE 1929

ON OUR OWN AIRPORT - IN THE HEART OF THE AIRCRAFT INDUSTRY

BE WISE—PROTECT YOUR FUTURE

MAIL TODAY • DON'T DELAY

WITHOUT COST OR OBLIGATION SEND ME FULL INFORMATION AND CATALOG ON THE COURSE CHECKED BELOW

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- ☐ MASTER AVIATION MECHANIC COURSE
- ☐ SPECIALIZED ENGINE COURSE
- ☐ SPECIALIZED AIRPLANE COURSE
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- ☐ SPECIALIZED AIRCRAFT SHEET METAL COURSE
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- ☐ AIRCRAFT BLUE PRINT READING COURSE. HOME STUDY

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ADDRESS _____

CITY _____ STATE _____

DATE OF BIRTH _____ F-12

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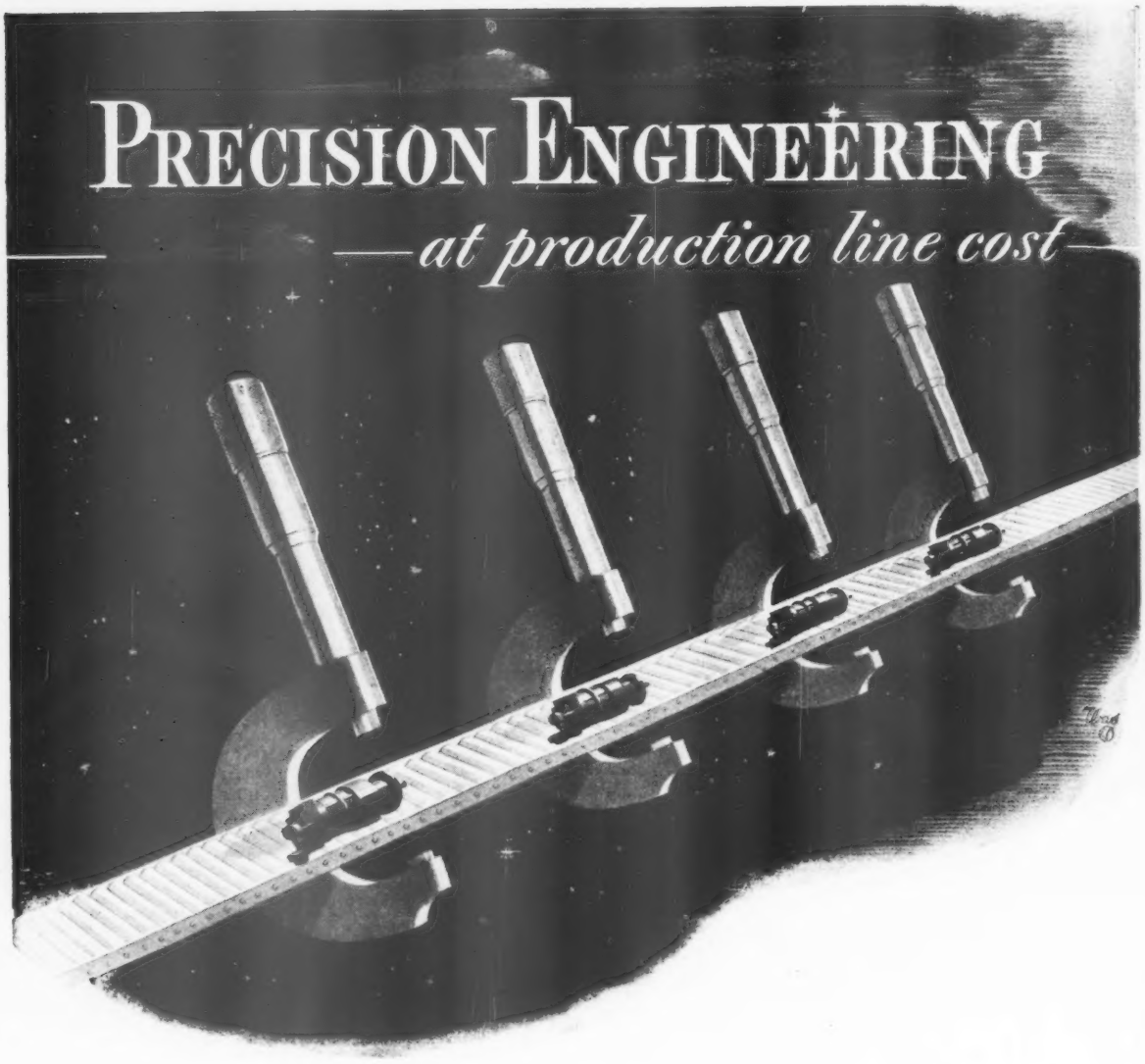
—at production line cost—



IN 3 weeks Jack & Heintz designed a unique retraction motor for the Air Forces . . . made important improvements in motor performance and life that had never before been thought possible . . . and in 2 more weeks were producing it in production-line quantity at a lower price to the government. When the war is won this Jack & Heintz ability will be available to industry—to help you with better parts or products, engineered and produced with new precision at production-line speed and low cost, to meet your postwar competition. We would like to show you this unique combination at work now. Jack & Heintz, Inc., Cleveland, Ohio, manufacturers of aircraft engine starters, generators, gyro pilots, gyro flight instruments, magnetos, motors.

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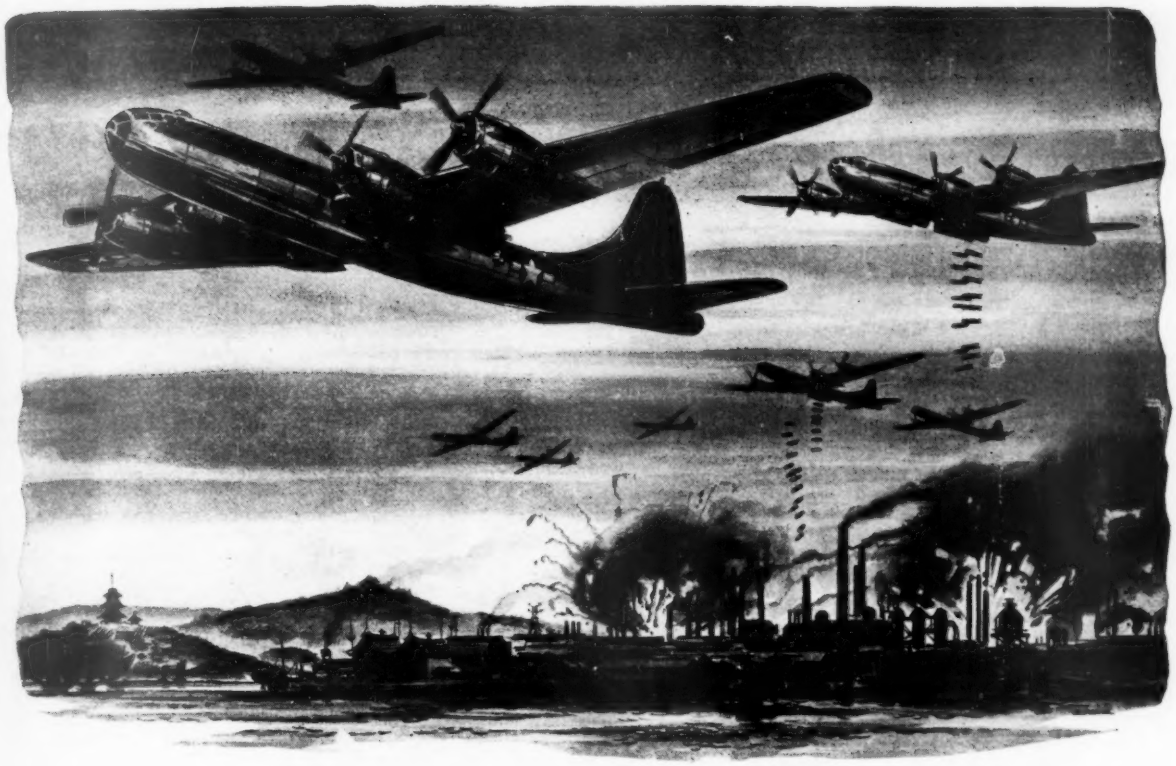


NEW THRILLS FOR OLD SKILLS

BUILDING aircraft from light metals, from aluminum and magnesium alloys as well as from the high strength steel alloys, was an old skill to Goodyear engineers with years of pioneering behind them. But producing, in large quantities, components for such war wonders as the Superfortress bomber and the Black Widow night fighter, has meant a series of thrilling new accomplishments in engineering. War record of the 14 planes for which Goodyear Aircraft Corporation has built major components, as well as the successes of Navy patrol airships and the famous Navy Corsair, speaks well for the skills of Goodyear—one of the great names in aircraft. *Goodyear Aircraft Corporation, Akron, Ohio.*

GOODYEAR
A GREAT NAME IN AIRCRAFT

BUY WAR BONDS BUY FOR KEEPS

TO FIGHT THERE AND BACK

In this war pilots often fight far over enemy territory, hundreds of miles from their base. So fighter planes need range as well as sting. ★ In such sorties the Allison engine has proved its mettle. Its economy adds miles to every tankful. Its dependability keeps it in the fight, helps get both plane and pilot back from hazardous encounters. Its smoothness and response lessen pilot fatigue. ★ Qualities like these will continue in importance after the war's end. They will contribute to the comfort and safety of your flights in the days of great air transport to come.

POWERED BY ALLISON
P-38—Lightning
P-39—Airacobra
P-40—Warhawk
A-36 and P-51—Mustang
P-63—Kingcobra

More than 60,000 Allison engines have been built for the above planes of the U. S. Army Air Forces.

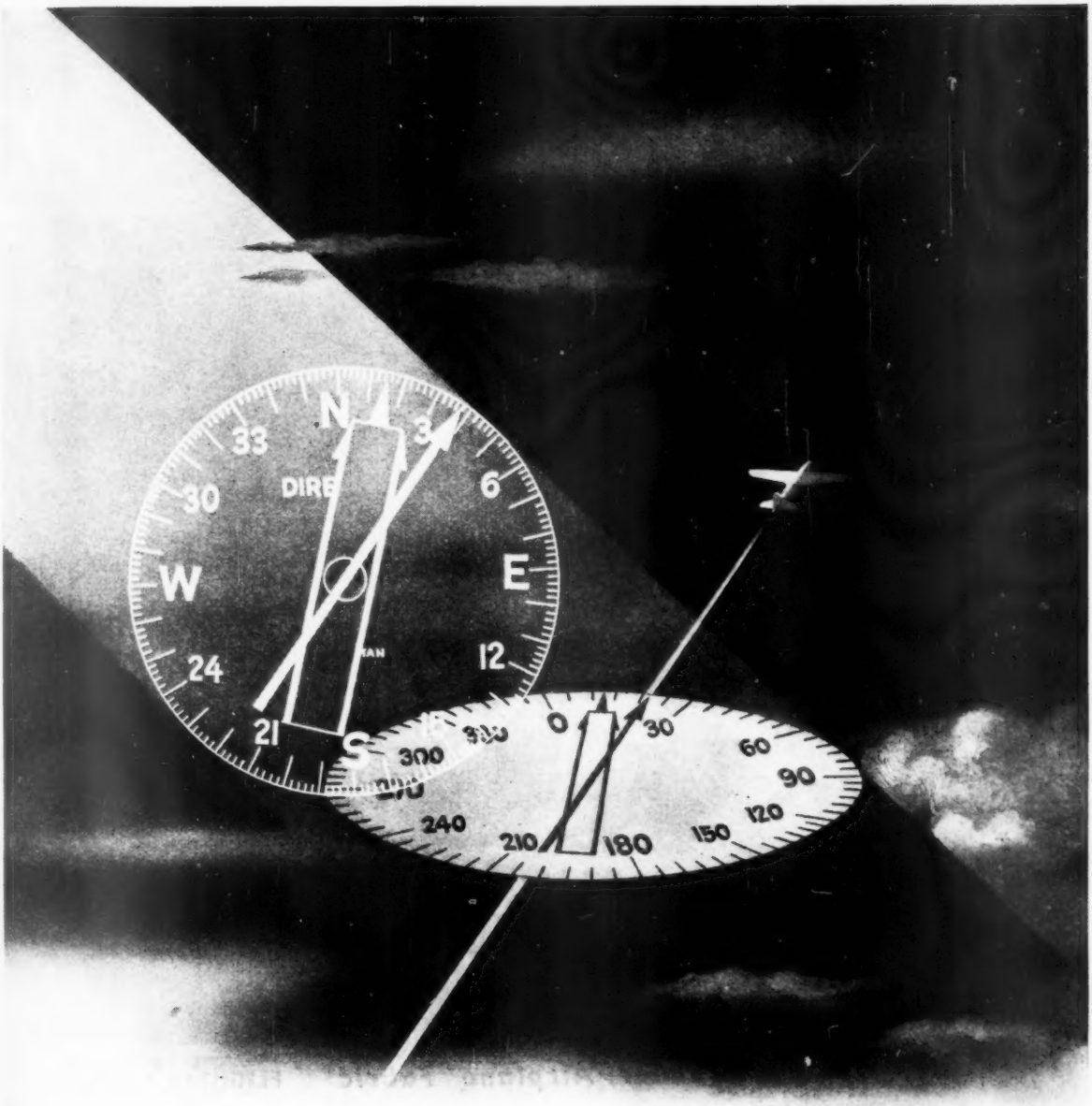
LIQUID-COOLED AIRCRAFT ENGINES

Allison
DIVISION OF
Indianapolis, Indiana

GM
GENERAL MOTORS

KEEP AMERICA STRONG
BUY MORE WAR BONDS

Every Sunday Afternoon
GENERAL MOTORS SYMPHONY OF THE AIR — *NBC Network*



SIMPLIFIED COMPASS INDICATION for the pilot is one of the features of the Kollsman Direction Indicator. This new direct reading, easy-to-read, easy-to-follow compass has a convenient reference pointer that can be set to the desired course making it necessary only to "match pointers." It is regarded by many pilots as one of the greatest steps taken to simplify cross country navigation for the pilot. For an illustrated folder on this original Kollsman development, write Kollsman Instrument Division, 80-08 45th Avenue, Elmhurst, New York.

KOLLSMAN AIRCRAFT INSTRUMENTS

PRODUCT OF

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ELMHURST, NEW YORK • GLENDALE, CALIFORNIA

THE painstaking precision that goes into the manufacture of Flightex is your assurance that every yard is uniformly perfect. No wonder each year more manufacturers buy more Flightex than any other airplane fabric.

World's Premier Airplane Fabric

FLIGHTEX FABRIC

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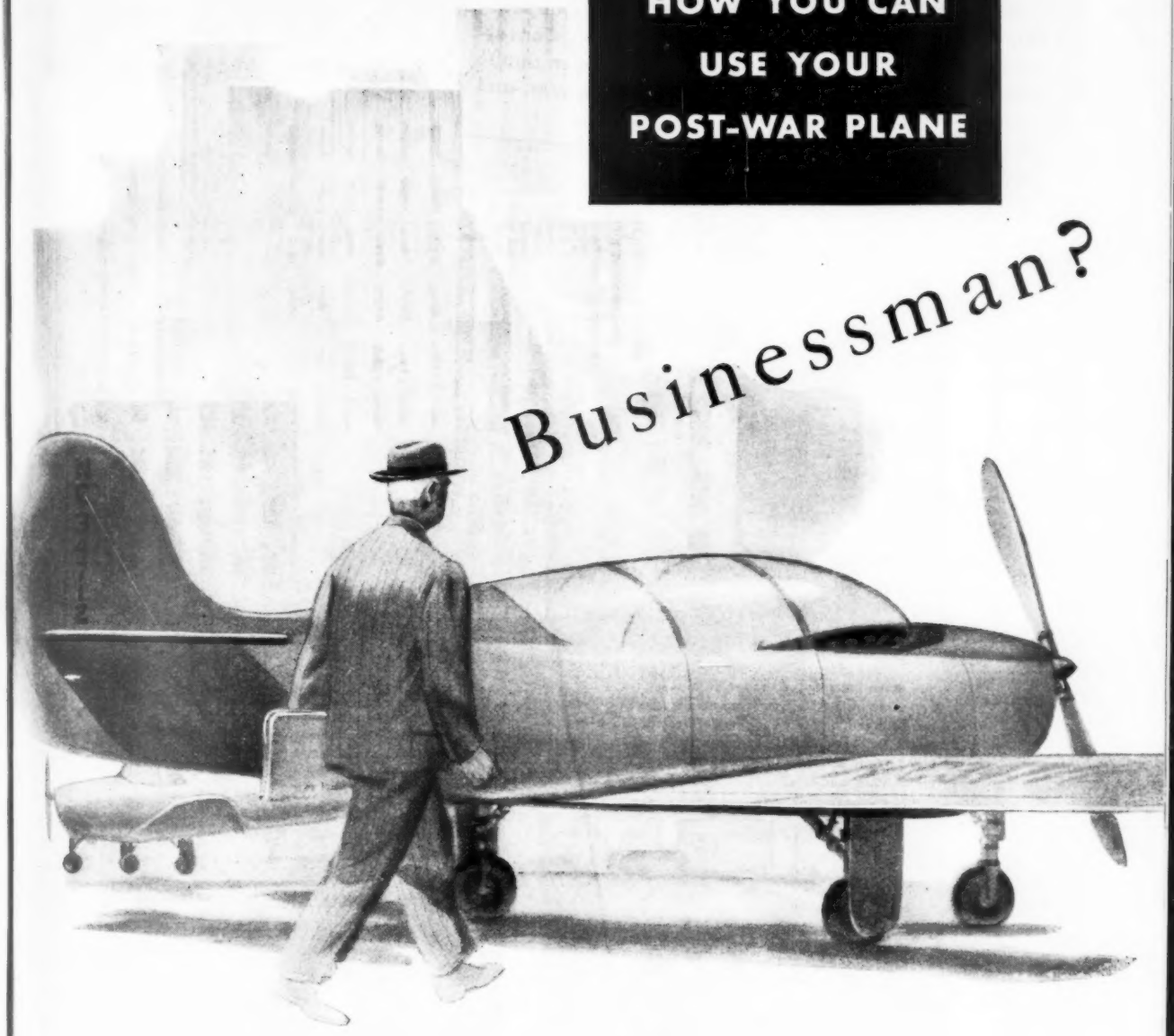
BOB TRADER-AERO SUPPLY, Pittsburgh, Pa.
INTER CITY AVIATION, INC., East Boston, Mass.
KARL ORT, York, Pa.
LEAVENS BROS. AIR SERVICE, LTD., Toronto, Canada.
PACIFIC AIRMOTIVE, Burbank, Cal., Oakland, Cal.
SNYDER AIRCRAFT CORP., Chicago, Ill., Columbus, Ohio.
SUPPLY DIVISION, INC., Robertson, Mo., Memphis, Tenn.
THE AIRCRAFT STEEL & SUPPLY CO., Wichita & Kansas City, Kansas, Dallas, Texas.
VAN DUSEN AIRCRAFT SUPPLIES, Minneapolis, Minn., Waterloo, Iowa.

HOW YOU CAN USE YOUR POST-WAR PLANE



Personal appointments in Chicago, Detroit and Buffalo in one day! Impossible you say?

Not impossible when present plans for post-war personal planes and landing facilities materialize. In fact, executives are looking to tomorrow's flying to minimize what has been one of the greatest wastes in business—the time lost in getting from one out-of-town appointment to the next.

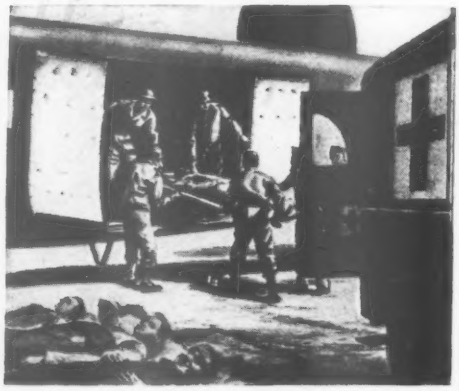
The engines for these planes-to-be—smooth, efficient, completely dependable FRANKLIN engines—are now in the works at Aircooled Motors Corporation. All you need remember is to specify FRANKLIN power for *your* personal post-war plane.

Franklin
FINE AIRCRAFT ENGINES

AIRCOOLED MOTORS CORP.
SYRACUSE 8, NEW YORK

This advertisement is one of a series which is appearing in national magazines and newspapers as Consolidated Vultee's contribution toward a clearer public understanding of transportation's role in the war, and its postwar opportunities and responsibilities.

Sulfa, Plasma—and Air



1. **Since the start of the war,** thousands of wounded Americans have been evacuated from battle zones by air. Said the Air Surgeon General's report: "The record places air evacuation in a group with the sulfa drugs and blood plasma as one of the three greatest lifesavers of modern military medicine."

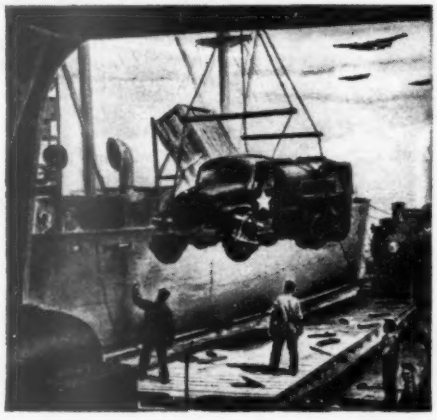
2. **In long-range transport planes** such as the Liberator Express, no wounded American fighter is more than 60 hours' flying time from the finest hospital in the U. S. A.

3. **As the hospital plane streaks across the ocean,** a flight nurse gives somebody's blood – perhaps *yours* – to this wounded soldier who might otherwise never get home for the special care that will restore him to health.

4. **From many a remote combat zone,** the plane is the *only* means of getting casualties back to base hospitals.

CONSOLIDATED VULTEE AIRCRAFT

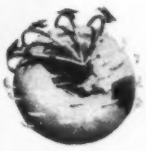
5. The ambulance, hospital train, and hospital ship still transport most of our war casualties. But many a time when *minutes* can save a life, the 4-mile-a-minute speed of the flying ambulance does exactly that!



6. One reason we are winning the war is the way in which the truck, the train, the ship, and the plane are teaming up together. And the task of rebuilding the peacetime world will be a challenge which all forms of transportation must meet in the same way.

• • •

But the plane, in addition to its use as a global air transport, will have still *another* role to fulfill: a permanent postwar Air Force can well become the ever-watchful guardian of the peace we shall have won so dearly.



No spot on earth is more than 60 hours' flying time from your local airport

From "Flying Jeeps" to Leviathans of the air — *The planes shown below were all designed and developed by Consolidated Vultee. When peace comes, the company will be in a position to provide the postwar equivalent of such planes, from small, privately owned "air flivvers" to huge, transoceanic cargo-and-passenger planes.*

LIBERATOR... 4-engine bomber

LIBERATOR EXPRESS... transport

CORONADO... patrol bomber

CATALINA... patrol bomber

VENGEANCE... dive bomber

VALIANT ...basic trainer

RELIANT... navigational trainer

SENTINEL..."Flying Jeep"

QUICK FACTS FOR AIR-MINDED READERS

Air Giant — The new Consolidated Vultee Model 39 transport plane — the Liberator Liner — has passed its test flights successfully. Capacity of this 4-engine transoceanic airliner: 48 passengers — or, as a sleeper, 24. Top speed: 275 m.p.h. Flying range: over 4000 miles.

Airport for Air Giants — New York City's projected airport will have runways totalling 13 miles in length, one of which will be over 2 miles long. This airport can handle 1000 plane movements per day. (Capacity of present N. Y. airport: 270 plane movements per day.)

• • •

1000-mile Shuttle Trips — The Naval Air Transport Service in the Pacific now flies 320,000 miles per week, carries over 5500 passengers monthly, reports that it "adds another stop every time the Japs lose another island."

Tomorrow's Airmen: The total strength of the Army Air Forces now exceeds 2,300,000 officers and enlisted men — a vast reservoir of skilled pilots and aircraft technicians which will insure postwar America's remaining "a nation on wings."

Consolidated Vultee is the largest builder of airplanes in the world.

CORPORATION

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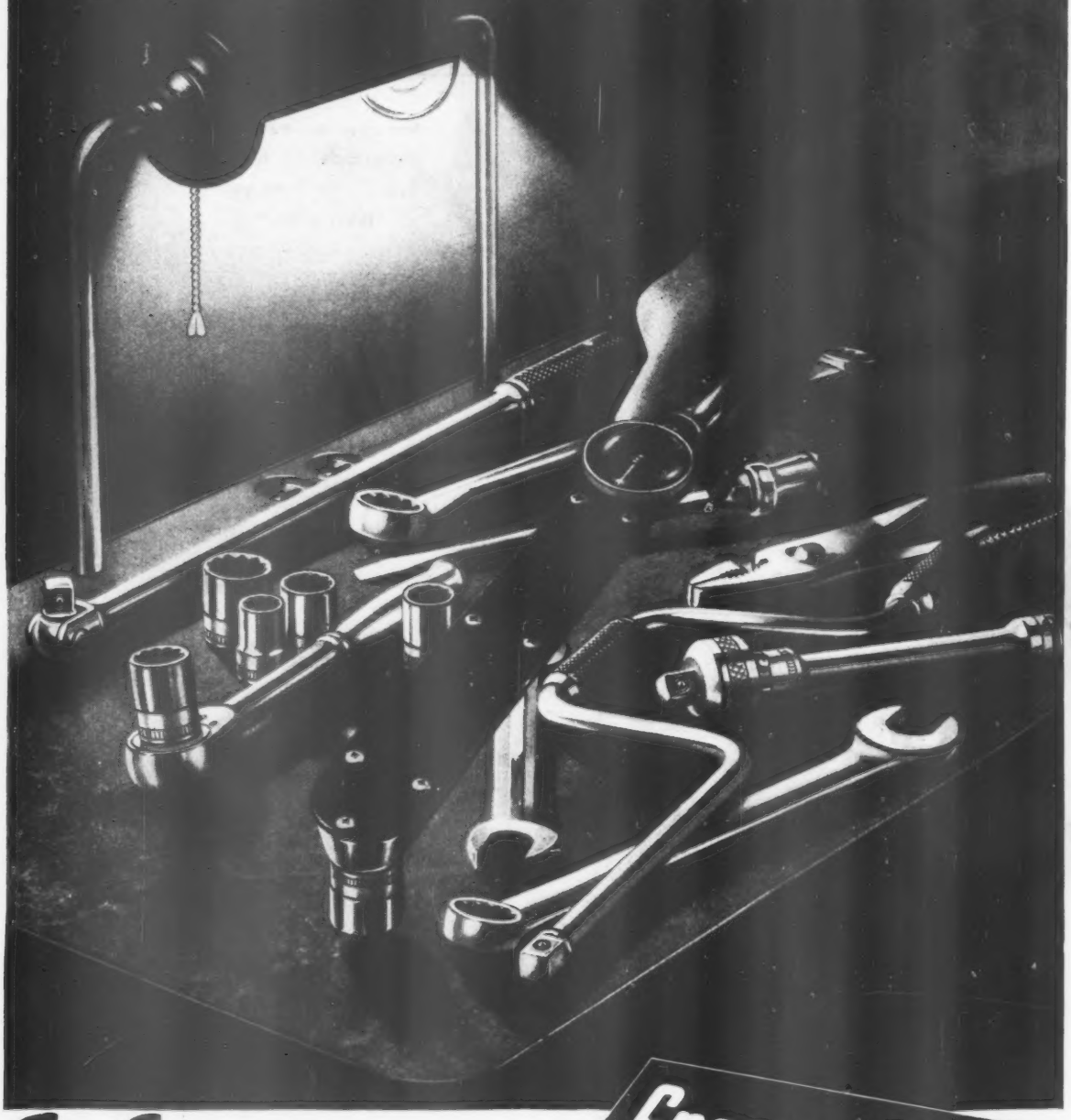
Member, Aircraft War Production Council

THE CHOICE OF BETTER MECHANICS



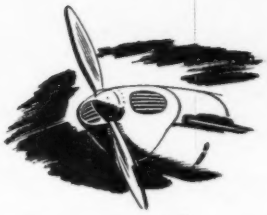
Snap-on Tools
THE CHOICE OF BETTER MECHANICS

For Every nut turning operation there is a Snap-on wrench *engineered* to do the job better, easier, with greater accuracy and safety. Standout for *precision* is the Snap-on Torqometer shown above . . . unexcelled among tension measuring wrenches for unfailing accuracy under all conditions.

Widely used in factory assembly where accurate bolt tension is essential, Snap-on Torqometers are also the choice of better service mechanics. As you tighten the bolt, you *watch* the tension increase . . . on the easily read dial . . . and stop at exactly the pre-determined pressure.

Snap-on's Torqometer series covers every tensioning requirement . . . 15 sizes ranging from zero to 30 in. lbs., up to 2000 ft. lbs. New industrial uses, such as adjusting tension on bottle capping machines, power hack saws, etc., are continually developing. Write us your tensioning problems and our engineers will gladly advise on individual requirements.

SNAP-ON TOOLS CORPORATION, 8024-L 28th Ave., Kenosha, Wis.

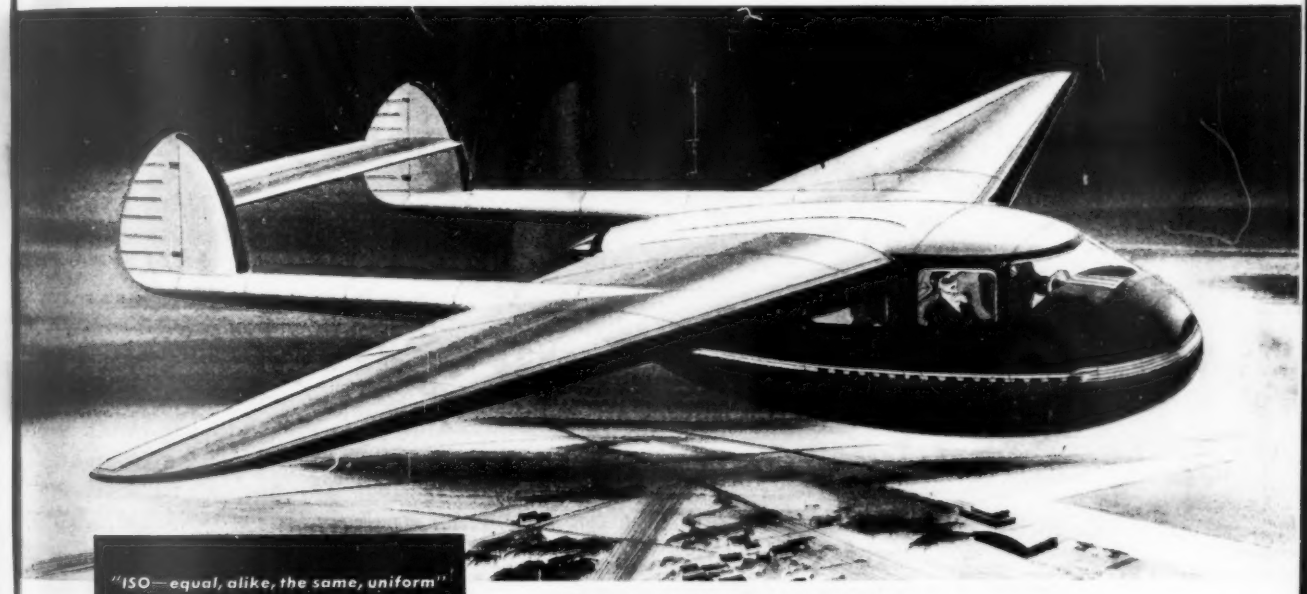


ISO-REV Constant Speed PROPELLERS
FOR UNSURPASSED EFFICIENCY

ISO-REV precision constant-speed governing at any RPM selected during flight, irrespective of power input or air speed, affords take-off at 100% of available horsepower plus optimum aerodynamic propeller efficiency and engine economy under all conditions of flight.

Today our entire energies and resources are devoted to the nation's war effort.

We feel fortunate that our contribution toward victory may also place added enjoyment and utility within reach of the plane owner of tomorrow.



"ISO—equal, alike, the same, uniform" Webster

ISO-REV CONSTANT SPEED propellers

AIRCRAFT SPECIALTIES DIVISION

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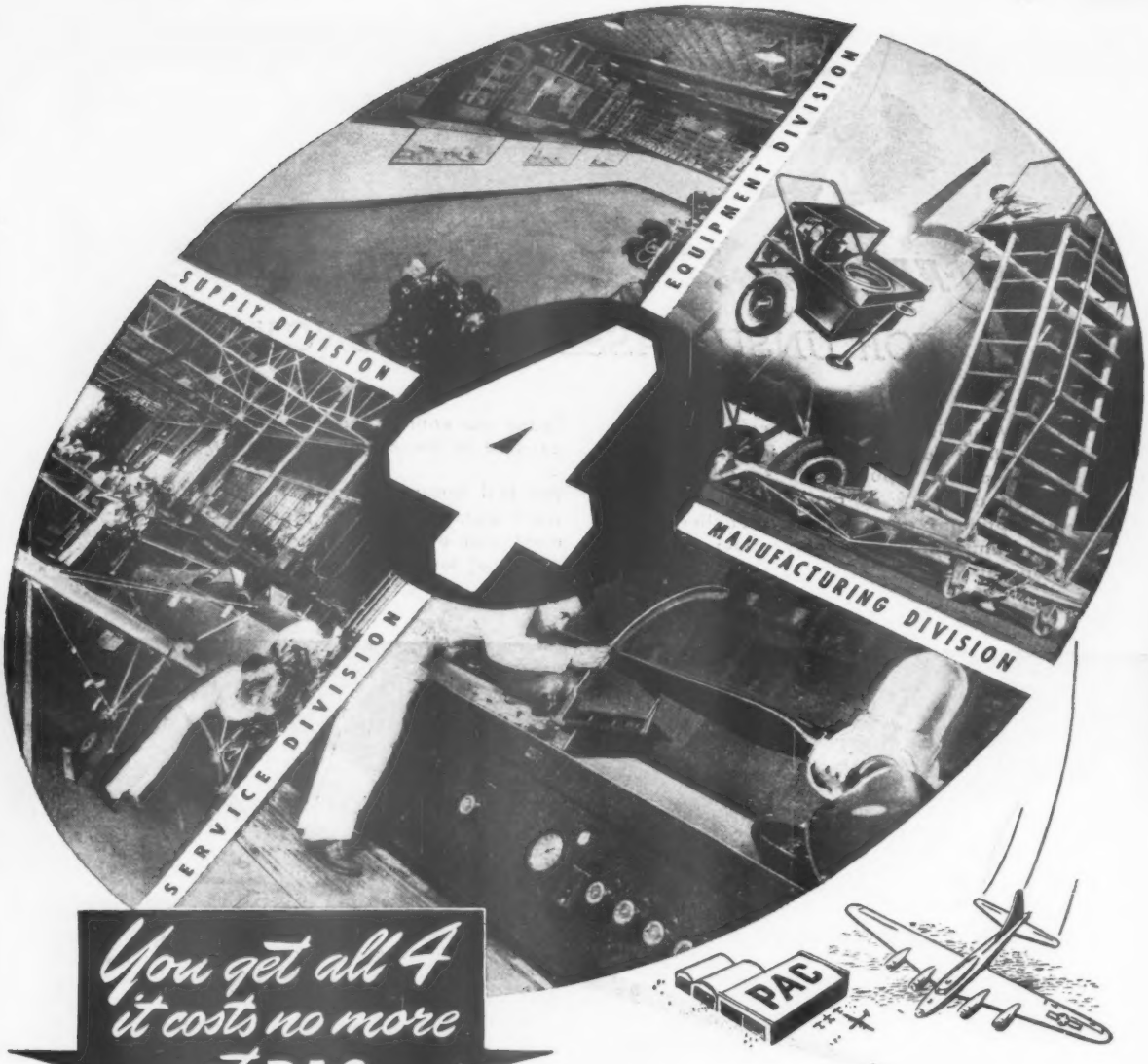

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GLENDALE	Executive Offices, 409 No. Brand Blvd.
GLENDALE	6265 San Fernando Rd.
OAKLAND	Oakland Airport
SAN DIEGO	544 7th Avenue
KANSAS CITY	1628 McGee Street

Designed by RCA—

THE BC-348 AIRCRAFT RECEIVER

IN THE MONTHS before Pearl Harbor, when World War II was still in distant Europe, a farsighted group of Signal Corps and RCA engineers were busy, planning a new aircraft receiver... a receiver that was destined, in a few short years, to fly over every important enemy and friendly capital in the world. That receiver, in the long list of Army radio developments, was the then unheralded number ... BC-348.

The number...BC-348...means little, but the receiver, backed by RCA's research and experience, became such an important part of the Signal Corps' program that the list of planes in which it is installed reads like a roll call of famous Air Forces bombers—up to and including the B-29.

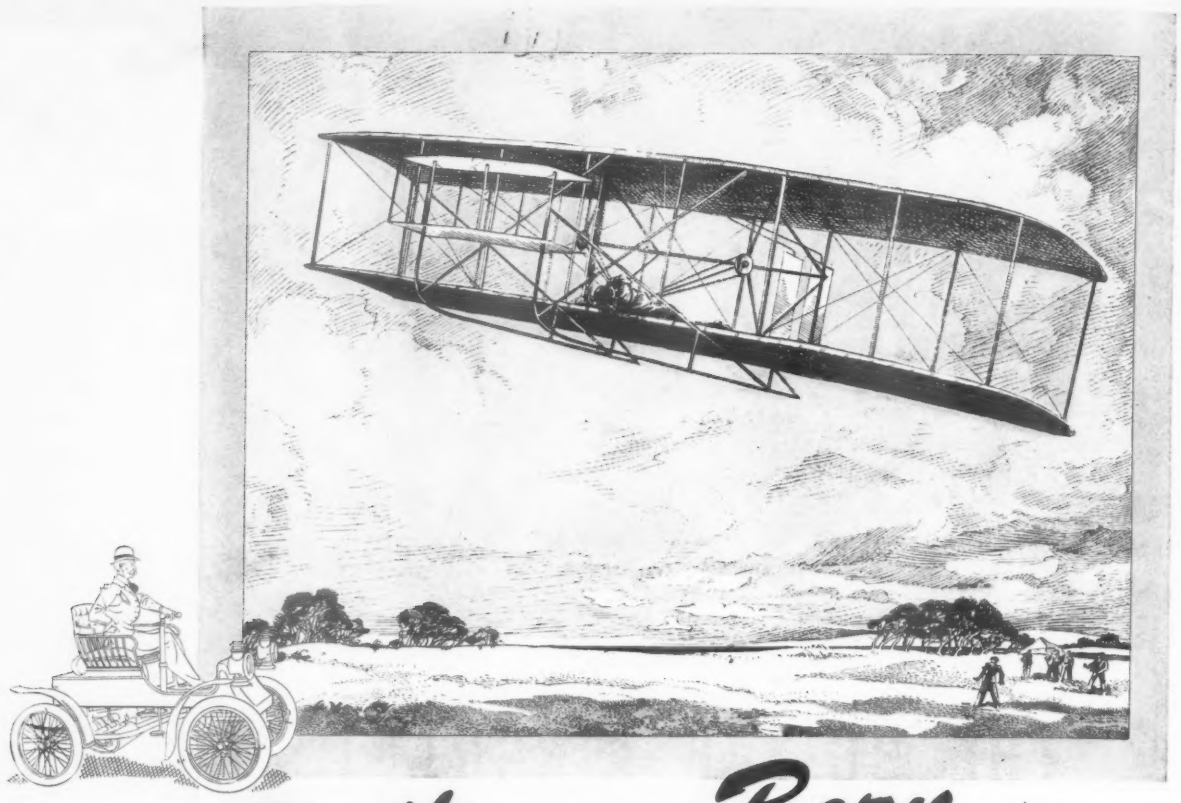
Thousands have since been produced by RCA and many other manufacturers. Thousands more will be made, until the advancing radio art tops its outstanding sensitivity, selectivity, image rejection and its reliable and convenient operating features.

This receiver is only one of the many aviation design which RCA engineers have contributed to our Air Forces magnificent flights to Victory. Still more contributions ar in the making and, when hostilities cease, these same eng neers, still more experienced by war's ceaseless demands will make equally important contributions to peacetim aviation.

RCA

RADIO CORPORATION OF AMERICA

RCA VICTOR DIVISION • CAMDEN, N. J.



Both were Born

at the turn of the Century

1903!

In America, the Wright brothers were building the first successful engine-powered airplane which on December 17, 1903, made its historic flight.

In France, Maurice Houdaille was in the midst of experiments which soon led to the world's first rotary, double-acting hydraulic shock absorber — the forerunner of today's Houdaille Aviation Shimmy Damper.

The intervening years have been rich in experience. Houdaille installations—on thousands of aircraft, on millions of motor cars and motor trucks, on heavy military vehicles, on streamline trains — provide an engineering background without parallel in our specialized field.

We invite the aviation industry to draw upon this experience in their planning for the future.

HOUDE ENGINEERING DIVISION OF

HOUDAILLE-HERSHEY CORPORATION

MAKERS OF HYDRAULIC CONTROLS

Buffalo 11, New York

*PRONOUNCED: HOO-DYE

The Houdaille Shimmy Damper controls nose wheel shimmying on America's foremost bombers and fighters . . . and tail wheel travel on huge cargo planes, as well.*

POST WAR AVIATION OPPORTUNITIES Bulletin

VOLUME 1 NUMBER 2

Insurance Business Offers Specialized Jobs for Air Force Personnel

Some of you mechanics, ground crewmen and gunners may be interested to know that the insurance business offers sound postwar possibilities where your aviation experience and knowledge will be of value.

SPECIALIZED FIELD

Aviation insurance is a specialized field. Just as marine insurance requires the services of trained men who know ships and shipping, so underwriting aviation requires a personal knowledge of planes and flying. Aviation underwriters want men who speak the language and know the limits of aircraft.

MECHANICS NEEDED

Aviation mechanics will be of great value in the adjustment departments. When an insured plane crashes, the insurance company must determine whether or not the ship is capable of being repaired and if so whether bids for the job are reasonable. From their wartime experience, most mechanics would be able to tell approximately the number of man-hours needed to effect repairs, cost of materials involved and survey bids on the job accordingly.

OTHER USES

Such expert technical knowledge will find still another opening in the engineering and inspection departments. Several of the aviation underwriters maintain these departments to enable them to keep a check on insured equipment. It is essential that the companies know for themselves the true mechanical condition of the planes they insure, to ascertain when the plane or planes have depreciated mechanically to the point where they are overinsured. Private flying is certain to establish itself on a widespread basis after the war, and insurance companies will need representatives in every modern community as aviation field men.

The second in a series of bulletins designed to acquaint ground and flight personnel of the Army, Navy and Marine Air Corps with new developments in the field of commercial aviation. Union Oil Company does not believe the war is won, but we do think many members of the air forces are wondering what they will do when peace comes. We believe they will be interested to know of any opportunities which exist for them. Inquiries are welcomed, and we will be glad to furnish information to interested personnel. Address—Aviation Department, Union Oil Company, Room 700, 617 West Seventh St., Los Angeles 14, California.

6,000 Airports in U.S. by 1949; CAA Program to Reach Large and Small Communities

With all the talk about increased uses of aircraft in the postwar world, it may be interesting to know where they're going to land.

TYPES OF FIELDS

One of the most authoritative programs for widespread development of landing facilities in the United States is the one drawn up by the Civil Aeronautics Administration and soon to be submitted to Congress. This program calls for 6,000 airports in the next five years and is designed to promote two types of landing fields: airparks for private flying and air terminals for commercial transportation. Emergency fields and intermediate strips are also contemplated.

Proposed airports will provide a half million jobs for construction alone and another half million jobs in operations, maintenance, manufacturing and supporting industries.

NEED OF MODERN LAYOUTS

Many small towns already have the usual "cow-pasture" type of airport with a hangar and a windsock for equipment, but regular air operation demands modern layouts. For example, it has been shown that it costs more to operate a twin-engined plane from a 4,000-foot runway than from a 6,000-foot runway.

Such a program by an organization of this size and responsibility is the most encouraging sign yet that postwar aviation will not be hindered for lack of ground facilities.

AVIATION DEPARTMENT
UNION OIL COMPANY
OF CALIFORNIA
76

BEECHCRAFTS SERVED 26 NATIONS
BEFORE THE WAR

(Top) One of Starratt Airways' Beechcrafts used on skis and floats in passenger, mail and express service in the Canadian Northwest

(Photograph courtesy Starratt Airways, Ltd.)

(Center) Most Army Air Forces navigators were trained in Beechcraft AT-7 navigation trainers, like these three flying in echelon formation

(Official Photograph U.S. Army Air Forces)

AND WHEN PEACE COMES

Beechcrafts will be ready. Ready to serve the nations of the postwar world with aircraft refined and proven by millions of miles of accelerated wartime service. Ready with designs ideally suited for feeder airline use, for executive transport, for business and charter purposes, and for exhilarating, swift, safe personal transportation.

After the final V-Day, Beechcrafts will *continue* to do their part.

Beech Aircraft
CORPORATION

BEECHCRAFTS ARE DOING THEIR PART

WICHITA, KANSAS, U.S.A.

This Administration's Air Policy

By
Hon. HARRY S. TRUMAN

The Government has done much for aviation, says this Democratic spokesman. A billion-dollar federal-aid airport plan is waiting.

EVERY major economic advance in America has been made in connection with a new advance in transportation. America is a nation of large distances, and the American is always impatient with distances.

The great era of canals enabled us to expand in mass beyond the fall line of the eastern rivers and extend westward from the eastern coastal states. The great era of steamboats opened up the navigable rivers. The great era of railroads enabled us to span the continent. The great era of automobiles, with the accompanying network of highways, freed traveling America from the common carrier and made every family the staff of an exploring expedition. The great era of flying, so far as we have experienced it, is still in the not too common carrier stage for the average man.

Plans have already been made by this administration for a post-war extension of airport facilities which will pave the way for the next great era of transportation in America. These plans concretely outlined, have already been submitted to Congress for consideration by the Civil Aeronautics Administration. This is only one of many far-sighted plans laid down by the Roosevelt Administration to assure a prosperous post-war U.S.A.

The nation in 25 years has spent 25 billion dollars to develop the highway network which has been essential to the widespread use of the automobile by the common people of America.

Plans which are before the Congress propose spending one billion dollars in the first five post-war years for the development of the airports and landing fields which are so necessary.

At the time this was written, Mr. Truman was United States senator from Missouri and Democratic candidate for vice-president. Whatever the election returns may be, Mr. Truman's article can be accepted as the Democratic Party's official air policy for the immediate post-war years.

The main highway system of America has been developed and improved by grants-in-aid from the Federal Government. This arrangement has worked out very well. It served the national interest by maintaining post roads and military routes, while at the same time serving the local populations.

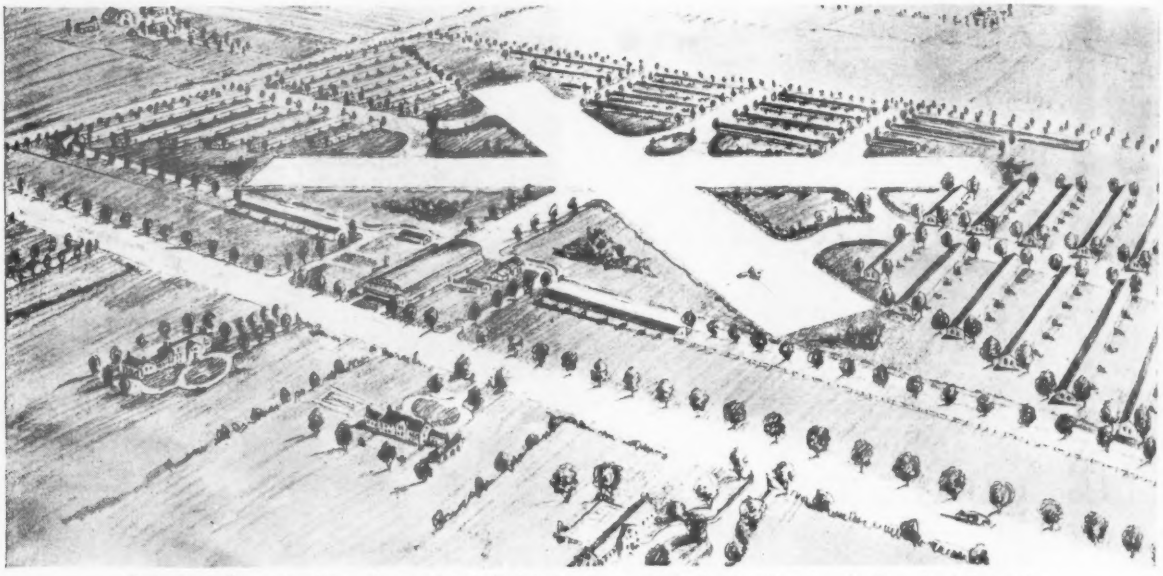
The proposed Federal-aid airport development would work out in an essentially similar way. It would provide the means for the general public to use airplanes, not only as common carriers, for the mail, for express and cargo, but for greatly expanded private flying. It would, at the same time, strengthen our economy and provide directly for the national defense. Once in operation, responsibility for the work will be decentralized to the communities which will benefit by it. In essence, it will be an invitation to local initiative and an opportunity for local private enterprise.

There are 6,600 communities in this country with a population of 1,000 or more. Each of these communities is a potential center of aviation in the present stage of its development. But there are only 3,000 civil airports—and less than 900 of them are suitable for transport planes. Only 286 are approved stops on scheduled airlines. It is estimated that 3,000 more civilian airports will be needed in the five years after the war if aviation is to develop in such a way as to insure the maximum benefits to the most people. Twenty-nine out of every 30 new airports would be smaller types of landing fields, suitable for private flying and small-business aviation ventures such as charter service, local and shuttle service feeding the main airlines, and flight training. Under this plan there would be 1,827 cities with air transport service instead of the present 286. The estimated cost of one billion dollars would equal about one-third of our annual national expenditure on streets and highways. Half of the cost would be paid by state or local governments, which would make the plans at home, and half by the Federal Government, to which they would apply. Facilities, constructed like those on highways, would be those used by the public—runways, safety devices, equipment for handling traffic. Private investment surrounding each installation could be expected to double the public investment.

One airport will suffice in small communities to handle all types of flying, but in the larger communities it may be necessary to have as many as three types, each handling similar kinds of aircraft. The central aircraft terminal in each city

(*Continued on page* 156)

PRIVATE FLYING and the



Enthusiastically received by private pilots is Parks' plan for a series of attractive airparks throughout the nation.

By OLIVER L. PARKS

President of Parks Air College says an entirely new concept of private flying must prevail for mass appeal.

Oliver L. Parks

POST-WAR private flying will have mass appeal only as it is safe, inexpensive, easy-to-learn and useful.

It will be safe because the amateur pilot will demand and the aircraft industry will therefore give him a two-control, stall-and-spin-proof plane which anyone who can drive the family car can fly with comparable lack of risk. Ercoupe typifies the kind of a plane I mean. Anyone with auto-driver qualifications can solo it in five hours or less.

The plane will be inexpensive to operate. Even including instruction charges, demonstration flying and cross-country training, the direct cost per mile will be approximately two cents. To put it another way, direct costs are less than those on the average Ford, Chevrolet, or Plymouth automobile.

Indirect costs—hangar space, repairs, insurance, new parts—will be initially more, but as the lightplane business grows they will come down under the inevitable pressure of mass markets and public demand.

These demonstrable facts are based on careful studies made during the past two years by the Parks organization. They must be applied practically post-war—with a resulting prosperity that will reach to scores of industries besides aviation and bring steady jobs to thousands of men and women—or private flying, aviation's best post-war bid for big business, will fail. And to that extent, aviation will also fail.

To make these facts reality is not going to be possible by wishful thinking—which brings me again to the last word in the first paragraph of this article—the word "useful." The post-war private aircraft must be useful or it will fail in its mission. And to become useful it must have plenty of places to land.

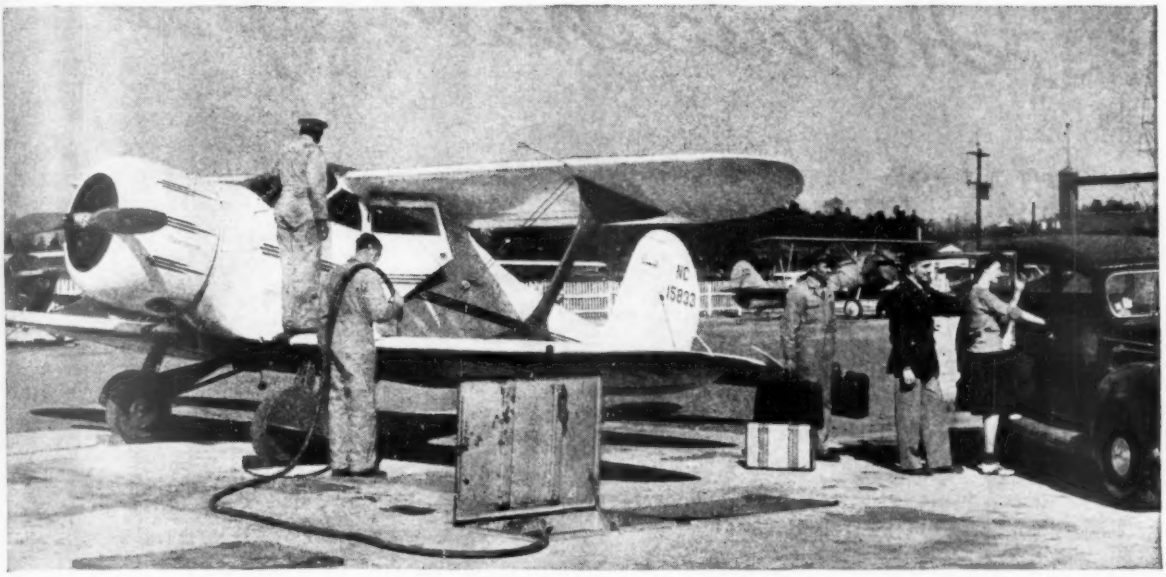
By "places to land" I do not mean airports in the currently accepted sense of the word. Indeed, for the benefit of post-war flying it might be a good idea to read the word "airport" out of the language. Its dictionary definition is adequate enough in a restricted way—"a place where aircraft may land to discharge or receive cargo and passengers, make repairs, or take in fuel." But the connotations of that definition are inadequate in the extreme.

To the average layman and even to many pilots, "airport" means a landing field which is a long way from everywhere. If the layman lives in a big city, the airport he is most likely to know is a long way from the heart of town and has the additional disadvantage—to him—of servicing only huge and frighteningly efficient and complicated transports and heavy aircraft of all kinds. If he lives in a small town, the airport he knows is also likely to be far from the heart of his community and has the additional disadvantage of being unattractive, dusty and lacking in the dozen small services that Joe Citizen has learned to expect as a matter of course. Worse, the place is inhabited not by the general public but by a race of self-appointed supermen who delight in leaving the impression that flying is a difficult art reserved only for the select and superior few.

How wrong this is—how fatal to aviation—can be determined by leafing through the statistics on airplane sales and licenses granted in the two decades preceding the current war. They indicate, not that flying was difficult to learn—a

(*Continued on page* 110)

FIXED BASE OPERATOR



Howard would add "consistently good service" to traditional airport operations which are now often haphazard at best.

By FRED HAMLIN

FLYING's Washington Editor

Beverly Howard plans to streamline his fixed-base operations, but sees no revolutionary change for future.

Beverly Howard

A WORLD in which the lightplane pilot-customer is always right is the only sort of a world in which private aviation enterprise will prosper.

Authority for this statement is Beverly ("Bevo") Howard, president of the Hawthorne aviation organizations, which already include seven operations in southeastern states, and whose post-war plans indicate that the traditionally sleepy south is wide awake to post-war aviation possibilities. His attitude may be said to typify that of southern leadership in aviation generally—and especially that of men planning various fixed-base expansion programs.

Howard readily admits that "fixed-base operators do not have unqualified answers for the host of post-war problems confronting them,"—nor does he anticipate an immediate and easy prosperity. Tightened belts and hard work, he asserts, will be the order of the early post-war days.

But with these reservations he predicts that "lightplane civilian flying, for the first time in its checkered career, is on the threshold of a sound and permanent prosperity so fulsome that it can move up from a sandlot airport status to take its place in community activity alongside banks, railroads, automobiles and business generally." He believes that this prosperity depends principally on one thing: "consistently good service for lightplane aviation's best customer—the private flyer."

Howard is not without qualifications as an aviation authority. As a flyer, he has learned to appreciate the private pilot's needs and the pre-war lack of services to fulfill them. In 1936, at the age of 21, he became the youngest pilot on a major airline, flying the New York-Miami route for Eastern and, later, between Jacksonville, Atlanta and Chicago. When he quit this job at 23 he was still Eastern's youngest pilot.

He went from airline piloting to a fixed-base operation at Charleston, S. C., and has since turned out more than 13,000 wartime and civilian pilots with an outstanding safety record.

His training and fixed-base operations have risen from a pre-war gross of $20,000 to a current gross of nearly $2,000,000. Last year he was selected by the Junior Chamber of Commerce the outstanding young businessman of South Carolina. He has surrounded himself with other flying personnel including William G. Catron, flight director at Orangeburg who has one of the best training records in the country; Claude Rinehardt, flight director at Columbia; Joseph J. Mitchener, Jr., former superintendent of CAA training in the southeast; and W. D. Strohmeier, former sales promotion manager for Piper. Each of these men has thousands of hours in the air.

Howard's conclusions on post-war aviation are based in part on hard facts and figures, in part on the old saw that good service means good business. His choice of locale for an aviation venture took cognizance of the south's ideal flying weather; he has carefully estimated the permanent interest in flying aroused among southerners by the intense Army and Navy training activities in that section.

But more important than these, in Howard's view, are the facts upon which he bases his service theory. He cites a re-

(*Continued on page* 109)

THAT *Hurricane Flight*

The three hurricane flyers study weather map. Left to right, Maj. Harry Wexler, Col. Floyd B. Wood, Lieut. Frank Record.

By WILLIAM WADE

This is the story of those three Army officers who dared to fly into the heart of the hurricane that recently swept the East Coast.

SPECIALLY-EQUIPPED *Mitchells* of an Army Air Forces weather squadron had been searching over the Caribbean for the birth of a hurricane for several days before September 14. Low barometric reports from remote weather stations indicate something was brewing and AAF scientists recognized the symptoms of a hurricane.

Then, late one day, the crew of a *Mitchell* sighted the outer fringes of a fierce hurricane. Word was flashed to the mainland by radio. Storm warnings were posted immediately along the Atlantic Coast. Remembering the tragic storm of 1938, the people of New England prepared to dig in.

Planes of the AAF weather service were dispatched on the first mission of its kind: to chart the course of the 1944 hurricane from its birth in the Caribbean until it expended itself in the North Atlantic. In Washington, three AAF officers maintained a constant vigil for 36 hours. Periodically, they coordinated their findings with those of the Navy and Weather Bureau meteorologists.

Early on the 14th, Col. Floyd B. Wood, 36, deputy chief of the AAF weather service, sent for Maj. Harry Wexler, former professor of meteorology at the University of Chicago. This was not to be Major Wexler's first hurricane; six years before he was in the teeth of the big New England wind.

Colonel Wood outlined a sensational plan. To quote from his official report of their flight into the center of the hurricane:

"Heretofore there has been practically no information available regarding the internal structure of tropical hurricanes, other than that derived from purely theoretical considerations. A point of prac-

(*Continued on page* 150)

The three Army officers explored the hurricane in this Douglas Havoc.

Blacksheep coat of arms.

PAPPY'S BLACKSHEEP

By GAITHER LITTRELL

Western Editor of FLYING

Unwanted by other units, "Pappy" Boyington's men banded together to form one of the Pacific's deadliest squadrons.

ONE of the deadliest combat groups the United States Marine Corps ever had in the air was illegitimate.

Its 27 members just didn't belong, yet these unwanted outcasts piled up the following record in two tours of duty that altogether lasted only nine weeks:

Enemy planes shot down in combat: 94.

Enemy planes believed destroyed, but unconfirmed: 32.

Enemy planes damaged in the air: 50.

Enemy planes destroyed on the ground: 21.

Ships destroyed: One 100-foot cargo steamer; one 50-foot cargo steamer; one 70-foot Japanese-operated Chinese junk, and one 70-foot steam launch;

Twenty Jap supply barges destroyed; three Jap barges loaded with troops destroyed; one raft loaded with troops destroyed, and 15 other surface craft sunk;

One hundred twenty-five Jap bivouac and concentration areas and antiaircraft positions on New Ireland, New Britain, Buka, Bougainville and the Shortlands strafed; four enemy airfields strafed; successfully intercepted enemy formations attempting to attack a task force reinforcing our troops at Barakoma; assisted Bougainville ground troops in an untenable position by strafing enemy mortar positions;

Participated in more than 200 combat missions and flew a total of 4,195 combat hours.

And on top of this, the squadron never lost a *Dauntless* dive bomber or an *Avenger* torpedo bomber when it was serving on escort missions.

What's more, this record was established with only 15 *Corsair* fighter planes and 27 fighting pilots.

But, back to the beginning. . . .

In several islands of the South Pacific various Marine flyers found themselves without squadrons of their own. This had resulted from numerous circumstances—a pilot being taken sick and his squadron moving on to other parts while he was recuperating; the breaking up of squadrons due to casualties from enemy action; loss and damage to planes, and deletion of squadron personnel through accidents and other causes. These men suddenly found themselves orphans, seemingly outcasts.

By and by, more than 20 of them had been rounded up and taken to Wing Command at Espiritu Santo, New Hebrides. Some of the flyers had been in

Eleven of these original Blacksheep have been lost in combat, including Maj. Gregory Boyington (arrow), who organized squadron.

Maj. Stanley R. Bailey, veteran commander of the Blacksheep, and "Midnight," their mascot.

combat, but for some unknown reason—some unexplained quirk that had never enabled the chasm of friendship to be bridged—they were apparently unwanted by squadrons being formed at base headquarters; unwanted even as replacement pilots. Somehow, they just didn't seem to "click" with other Marine airmen. They always seemed to be overlooked when a fighting squadron needed replacements.

This caused them to attach themselves to each other because of their common plight—no military combat mamma, no papa and no Japs to go shooting at—so finally they were formed into their own fraternal group.

The one to become the best known, and who was instrumental in the inception, training and leadership of the squadron, was the late Maj. Gregory ("Pappy") Boyington. With him was Maj. Stanley R. Bailey.

Boyington and Bailey—the "B-B Boys" from Pensacola days of not too long ago—had both been in combat and had enemy planes to their credit. Boyington, who earlier had resigned from the U. S. Marine Corps in order to join up with Maj. Gen. (then Col.) Claire Chennault's American Volunteer Group, better known as the Flying Tigers, had become an ace in the Chinese theater of operation. He had six Jap planes to his credit.

Bailey, who used to build and fly model airplanes before joining up with the Marine Corps, had knocked down two Japanese bombers on his first mission against the enemy.

These two men had been roommates together at Pensacola. They ate, drank and flew together from primary, through advanced training and finally on into combat.

Calm, methodical and reasoning, Bailey served as a checkmate for the independent, the-hell-with-it attitude of the more boisterous, fun-loving Boyington. They broke up when Boyington resigned his Marine captaincy to fly with the AVG.

They met again about a year later, on Espiritu Santo, both of them lonely and both considering themselves unwanted. There seemed to be no place for them in any of the squadrons then formed and operating against the Japs around the Solomon Islands.

In much the same predicament were Capt. George M. Ashmun, Lieuts. Robert E. Ewing, John F. Begert, Henry M. Bourgeois, William N. Case, Paul A. Mullen and Sanders S. Sims. They, too, had no squadron they could call their own.

Gradually, Boyington and Bailey started gathering these men around them. There were others, most of them replacements, sent only a short time before from the States to fill up gaps left in various squadrons through combat action, sickness, accidents, and every other situation that can befall fighting units.

Fairly soon, back in the summer of 1943, there were 26 youngsters and Boyington—an "old man" at the terrible age of 31—banded together. It was all confusion. These men, highly trained and aching for a fight, had at last got to the fighting front but had been shoved about from one group to another.

They never felt they belonged to anyone.

Completely "fed up" with the situation, Boyington and Bailey started an earnest "squawk."

They were so persistent and their "beefing" became so loud that wing headquarters could no longer ignore them. Day after day, Boyington and Bailey would storm into headquarters and demand they be permitted to form a squadron. This group, they insisted, had to be made up of the "outcasts."

Their request, which had come close to being insubordination, was eventually granted. Boyington was designated commander. He immediately turned to Bailey, saying:

"Stan, you're my executive officer!"

That night there was a celebration. Two bottles of Scotch were unearthed somewhere. During the course of the party someone suggested that it was the "Outcasts' Outing." And there, too, the squadron's name was selected.

The squadron had been officially designated VMF-214. But unofficially, when the Scotch drained low, they voted to be known as "Boyington's Bastards."

They started training under that designation the next day. But only a few days later a sober Marine combat correspondent hurried to see Boyington and Bailey.

"Look," he began, "you fellows have a great gang here. You are going into combat and you are going to knock down a lot of Jap planes. But when guys like myself start writing about you, no wire service or newspaper in the country is going to carry the designation, 'Boyington's Bastards.' Take my advice. Change it!"

They started calling themselves the "Blacksheep." A dash of picturesque spice was added when someone remembered that in olden English days there existed a shield which denoted illegitimacy. It was bordered with black and had a wider black stripe running through it diagonally from the upper right down to the lower left corners. This shield they adopted. On it they superimposed a blacksheep, while at the top they fashioned a front view of their aerial weapon—a Chance Vought *Corsair*, with its gull wings.

It is doubtful that any other group of men could have accomplished what the Blacksheep did in so short a time. Vet-

(*Continued on page* 130)

Crowell-Collier's president, Thomas H. Beck

The BECK PLAN

By FRANKLIN D. WALKER

FLYING's New York Editor

A scheme to spur industrial re-conversion by leasing surplus warplanes to airlines.

A PROPOSAL to lease surplus military personnel and cargo-type transports to reputable foreign and domestic airlines on the specific condition that the lessors place orders for new planes when the lease is signed has been advanced by Thomas H. Beck, president of Crowell-Collier Publishing Co., and chairman of the Civil Air Patrol League.

Mr. Beck's novel program contemplates that all such planes, finished and usable or in process when the war ends, shall be offered "as is" for conversion and civilian use to recognized airline operators on the following basis:

1. Planes will be rented or leased for, say, $50 per day or some other suitable figure to all legitimate foreign and domestic licensed carriers who have or will place with American aircraft manufacturers orders for new planes of equal or greater payloads. The terms of such contracts must be acceptable to the Federal Government and to our manufacturers. The rentals would be negotiated on a plane-for-plane basis and for no longer than the period of time required to deliver each new plane.

2. Rentals or leases on this plane-for-plane plan shall be made, providing the orders for new planes are *bona fide* and accepted by the manufacturers with deposits of 25 per cent or more of the price.

3. Rent money, in whole or in part, may be credited against the purchase price of new planes on terms acceptable to the Government and to the manufacturer.

4. Planes rented or leased in this manner shall, upon return to the Government, be disassembled and reduced to original materials and sold as such, or put in a Government stockpile, unless there is demand for renewed similar transactions on a plane-for-plane basis with the same or other buyers of new planes.

5. All personnel and cargo planes not needed for use as outlined here shall be reduced to scrap metal and subject to such salvage of parts as public interest may require.

Mr. Beck pointed out that, under Point 4 of his program, surplus airplanes could be leased to more than one commercial airline. When the first lessor receives the new plane he ordered he would turn back his converted wartime model which would then be assigned to another operator until he, too, obtained new equipment. The second lessor would be required to fulfill all terms of the lease-purchase agreement in the same manner as the first.

In support of his proposal, Mr. Beck listed the following "whys" and "wherefores" of the program:

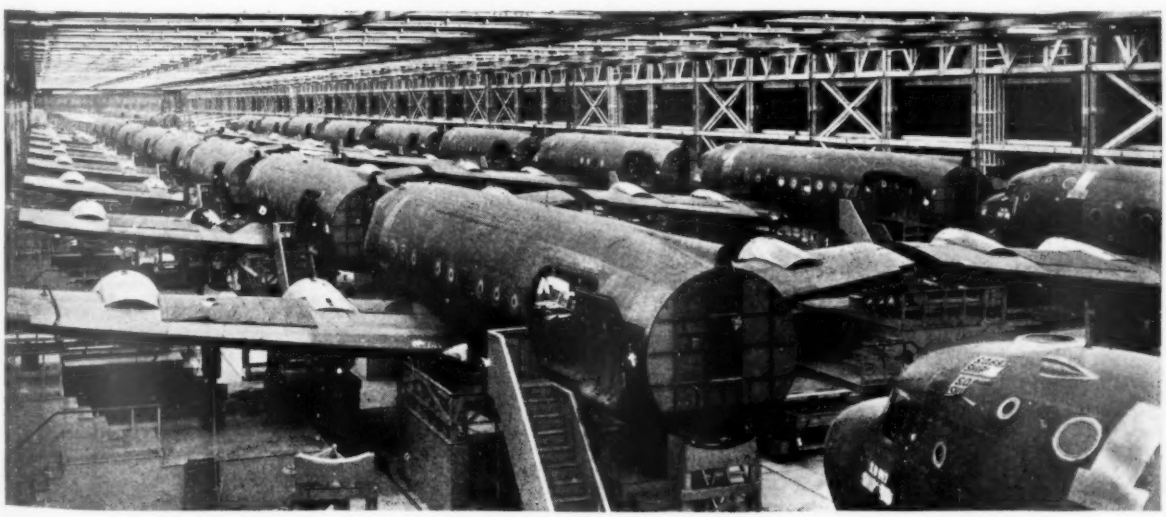
"It must be kept in mind that all items to be dealt with under this plan have been paid for once and are part of the cost of victory and security.

"The real problem is to afford the maximum aid and protection to industry and labor—particularly in the aircraft industry—and to insure maximum employment and future security. It is also of major importance to re-establish quickly private airlines and private flying everywhere.

"Stockpiles of metal would be an investment in future security.

"Technical and scientific improvements in aircraft construction are surging forward so rapidly that most of the present types are obsolete. Combat ships are wholly unsuited for civilian use; they are all specialized instrumentalities that have served their purpose well. Trainers are unsuited and obsolete compared with small craft awaiting production.

(*Continued on page* 144)



Skymaster assembly line headed for the AAF which Beck would rechannel for lend-lease to private industry at the end of the war.

AIRBORNE PLAGUES ?

By Maj. SEDLEY PECK

The speed of air transport threatens importation of dread tropical diseases. Only careful regulations can prevent them.

A RECENT Associated Press dispatch ran:

"Waikiki Beach was out of bounds to all military personnel today because of 10 cases of dengue fever among civilians, the first appearance of the tropical disease here since 1924. Dr. James Enright, director of communicable diseases, said the fever was brought in by persons infected in the South Pacific area. He was optimistic that the disease would be stamped out soon."

The story was quickly forgotten by most readers. In the myriad discussions of post-war aviation there have been only casual references to the health and sanitation requirements, quarantine regulations, and reciprocal agreements which will be prerequisite to international air transportation.

So long as the story reads: "Dengue Fever Hits Waikiki Beach" the public lethargy is undisturbed or nearly so. But suppose the story ran, "Dengue Fever Hits Miami Field"? Dengue fever is only one of several such possibilities, though it never invades England or the northern part of the United States.

A number of vicious, contagious, communicable, and epidemic diseases can be carried into this country by our own or foreign aircraft, their crews or passengers, or with their cargo. Some such diseases are known here and could be largely arrested by proved methods. But there are other diseases which are completely foreign to our people; which our medical men are not prepared to combat; and which could prove disastrous to those who have built up no natural immunity to them.

Rear Adm. Ross T. McIntire, Surgeon General of the Navy, told several hundred uniformed and civilian doctors at the closing session of the 15th Annual Scientific Assembly in Washington recently that one of the most serious problems to be faced by the medical profession here after the war will be epidemics of typhoid, malaria, dysentery, elephantiasis and other malignant tropical diseases which may come in the wake of troops returning from overseas.

Admiral McIntire stated that casualties returning from the Southwest Pacific, "almost invariably" bring back with them "to towns and sections of this country which have never known them" viruses which infect those regions. In many instances diseases already known by our medical profession appear in new forms which require new remedial measures.

Following the importation of the dread mosquito *anopheles gambiae* into Natal, Brazil, in 1928, there was an explosive outbreak of malaria with as high as 70 per cent of the population stricken in some areas. It was not until 1940 that this particular mosquito was eradicated from certain areas of Brazil and its complete extinction from the continent could be hoped for. Statistically speaking, this one importation required, in one state alone, the covering of 2,100 water wells and the

Public health officers take passengers' temperatures on arrival in U. S. This has led to discovery of typhoid and other diseases.

Flight personnel is immunized against diseases, including yellow fever and typhoid.

oiling of 2,800 others; the treatment of 19,040,817 water deposits; the use of over a ton of Paris green in spray; the inspection of 177,532 premises and the administration of 1,625,385 doses of quinine.

In this instance it was probably not an aircraft which assisted the dread vector into Brazil. But if it was imported by a slower means of transportation, the danger of disease which can be brought by aircraft is emphasized.

We must, at all costs, avoid the outbreak of epidemics of foreign type malaria, poliomyelitis, typhus, oriental sores, amebic dysentery, bubonic plague, yellow fever, African sleeping sickness or any one of the myriad tropical diseases which could be brought into this country.

President Roosevelt, in an address before the National Institute of Health on November 1, 1940, declared that the United States is less than a day by plane from the jungle type of yellow fever of South America. We are less than two days from the sleeping sickness of equatorial Africa, less than three days from cholera and bubonic plague. The world now has become so inter-related and apparently so small that our medical and sanitary responsibilities regarding disease are those of our next door neighbor.

We have gone a long way in the past two years in preventing the importation of the plagues—and we have had a lot of luck. Vaccination and inoculations of personnel, along with sanitary installations and education, have cut down the probabilities of spreading exotic diseases. Insect traps, sprays and deinsectization at overnight stations and bases have certainly been effective. It must be considered, however, that our foreign air transport during this time has very largely been military, and rigid rules tending towards immunization can be enforced.

We are signatories of the International Hague Agreement of 1933 and of the Pan American Sanitary Code of 1924 as "interpreted" in 1934 and liberalized in the Pan American Airway agreement of July 12, 1937, which concern vaccination of personnel, fumigation of aircraft and other fundamental sanitary and disease prevention provisions. Considerable streamlining may still be necessary, however, if we are to retain our "Healthiest Nation" position.

A few easily-transmitted scourges deserve special notice.

CHOLERA. Largely a Far Eastern malady, has made sporadic outbreaks on Near Eastern war fronts and starvation areas. Present air schedules make it unlikely for this disease to arrive undetected under normal conditions if the person carrying it is checked at the time of arrival. Cholera inoculation usually offers security for from four to six months, though it is a treacherous disease. Its varying period of incubation is, in some cases, less than three days.

YELLOW FEVER. This disease represents perhaps our major problem, since it is impracticable to quarantine all persons coming from infected areas for a sufficient time to make sure of detection. The last outbreak in this country was at New Orleans in 1905, since which time rigid inspections of incoming surface ships, improvements in sanitary conditions at ports of departure, and increased acceptance of inoculations which are good for from two to four years has kept this disease in check. But arrivals by airplane could upset this average. Yellow fever incubation requires from three to six days.

SMALLPOX. A person who has been "exposed" to smallpox is suspect for at least two weeks thereafter. Vaccination is required of all persons coming from afflicted areas and such vaccination is usually good for from one to five years. We must be alert, warns the United States Public Health Service, to "virulent strains of hemorrhagic smallpox. There is evidence that certain strains are so infectious that they will run a course in a moderately well vaccinated population."

PLAGUE. Bubonic plague, which is spread to man by fleas from infected rats, and pulmonary plague, which is transmitted directly from person to person, were the disease scourges of the early stages. There have been sporadic out-

(*Continued on page* 140)

Steward handsprays air against insects before arrival at airport of entry in U. S.

WHEN JOHNNY COMES FLYING HOME

By

PHILLIPS J. PECK

Labor writer, International News Service staff, Washington, D. C.

Skills acquired in flying planes like these Flying Fortresses will be the demobilized pilot's major bid for post-war employment.

FOLLOWING the armistice the United States may have well over 300,000 returning military pilots, to say nothing of 3,000,000 air-crew members who have a yen to fly.

Many of these airmen will lay aside their flying togs and go back into occupations interrupted by the war. Others will elect to remain part of the big peacetime air force which the Army and Navy contemplate and which Congress probably will endorse as insurance against future world conflicts. But thousands will want civilian flying jobs.

Can America's post-war aviation industry provide such employment? The answer is "No." Not if employment means actual flying jobs for every pilot available.

One of the most thoughtful appraisals of the post-war situation has been made by Paul E. Young, Chief of the General Inspection Division, Civil Aeronautics Administration, who says: "Granting the remote possibility of an enormous expansion, the post-war aviation industry will hardly be in a better position to absorb military pilots than it was at the conclusion of World War I. It all boils down to the basic law of supply and demand.

"Actually, we are faced with a post-war aviation picture wherein the employment scale will reach the saturation point almost the day of the eventual armistice."

Although the CAA itself has trained more than 200,000 pilots for the military, not all made the grade as combat flyers. In addition, Army and Navy training programs were curtailed with the consequent release to other military duties of would-be pilots. Nonetheless, countless thousands will have acquired a certain measure of flight training and will possess the desire to handle a plane after the war.

It is estimated that the Army alone will have 100,000 "top grade" combat pilots and 50,000 other Air Transport Command, instruction, and service pilots. Of this number 75,000 may be discharged at the end of the war. Young calculates that Navy, Marine Corps and Coast Guard discharges will raise this total above the 100,000 mark.

To the list of discharged combat flyers must be added the currently employed airline pilots, commercial pilots, and flight instructors, as well as Civil Air Patrol, the WASP and civilian air transport service pilots. That total supplies adequate basis for Young's pessimism about employment opportunities for all available flyers in peacetime aviation.

"It is a physical and economic impossibility," he concludes. "Yet we are confronted everywhere with 'the great post-war aviation industry.' It is high time that some of these over-zealous and imaginative super-prophets take cognizance of the fact that the immediate post-war aviation industry, viewed from any angle, will be a deflated wartime industry. Re-inflation is going to be a long hard task."

The CAA official further pointed out that General Arnold already has assured the airlines that the Army does not intend to remain in the air transport industry, which leads to the safe assumption that the Air Transport Command will eventually dump its personnel back into civilian industry. But TWA, PCA, American, Eastern, Pan American, United, Consair, and most of the other airlines that envision transoceanic and domestic increases in the post-war era, have utilized their Air Transport Command units to build up a gigantic reserve of well-trained pilot personnel that will be ready to take over at a moment's notice.

Over-optimistic individuals count on an almost endless world-wide organization of

There'll be some jobs, like crop dusting . . .

A forthright discussion of post-war aviation's most pressing problem—too many pilots; too few flying jobs.

airways to be served by U. S. carriers. The ATC—flying men, munitions and materials to the four corners of the wartime globe—flew approximately 240,000,000 miles during 1943, or about 110,000,000 miles more than the revenue miles flown by all domestic airlines combined during the same year. But if the world-wide needs of war required only 240,000,000 miles of flying, then commercial transoceanic airlines may find serious limitations on their post-war expansion.

In his examination of the post-war situation, Young reaches the conclusion that some 39,000 pilots may find full-time employment with the airlines, with flying schools and in miscellaneous service. That total is broken down in the following manner:

Airlines, 4,000 within two years after the war; flying schools, 15,000; miscellaneous, 20,000.

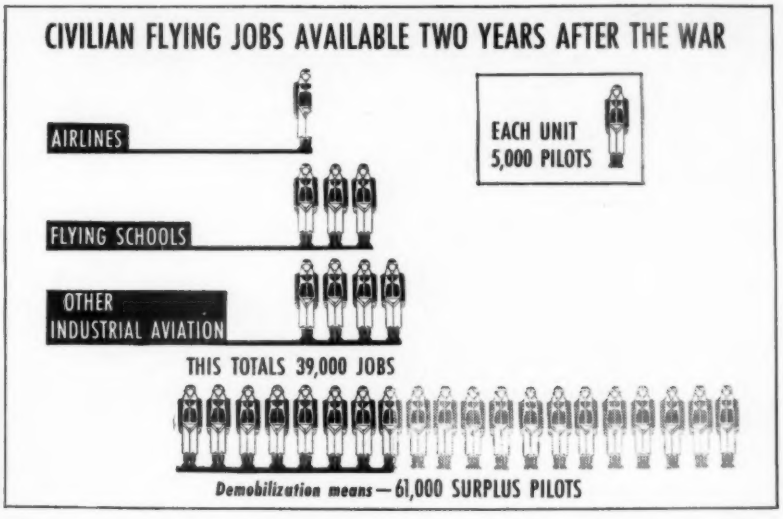
The latter category covers such flying as feeder-pickup, charter services, crop dusting and seeding, forest patrol, aerial survey and photography, air advertising, pest extermination, lake stocking, test piloting, demonstrations, etc.

From the standpoint of salaries, the airline jobs will be the most attractive, although there has been little change in the airline pilot's pay since 1934. First pilots are paid in accordance with the National Labor Board Decision No. 83, which has the approval of Congress. This formula, which was made a part of the Civil Aeronautics Act of 1938, established a minimum pay for both airline pilots and co-pilots. Slightly higher averages of pay have been set, however, through the medium of collective bargaining.

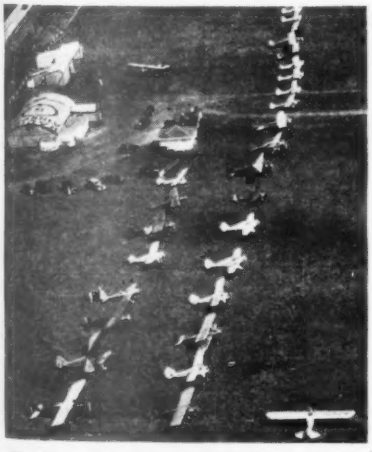
Striking a rough average of the airlines,

(*Continued on page* 100)

The airlines' 4,000 openings include none for captaincies. Co-pilots must work up to that.



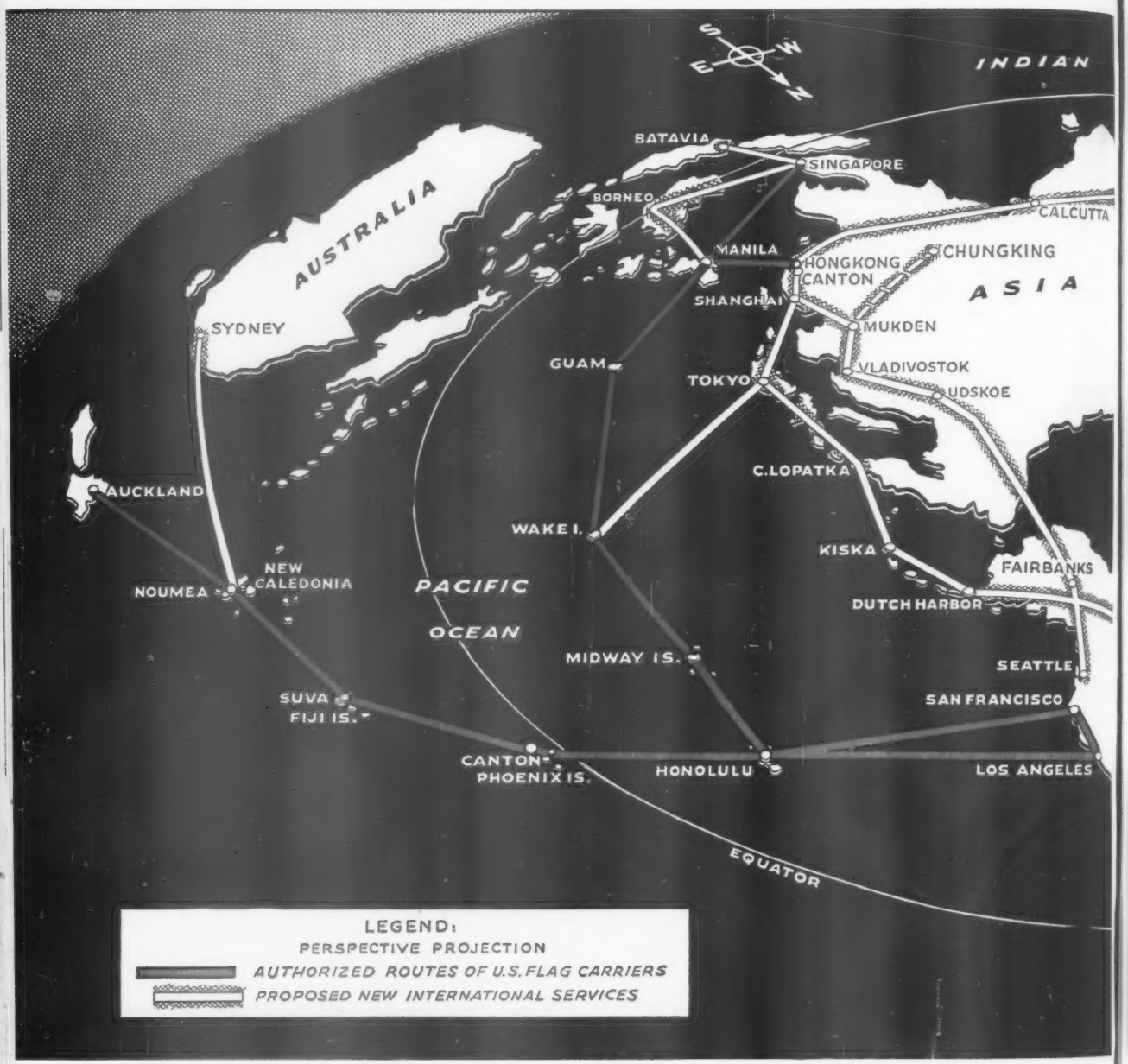
Graphic analysis of post-war pilot surpluses as estimated by Paul E. Young, CAA official.



Fixed-base operations, charter services . . .

And flying the many feeder-pickup lines.

Flying schools will need 15,000 instructors.



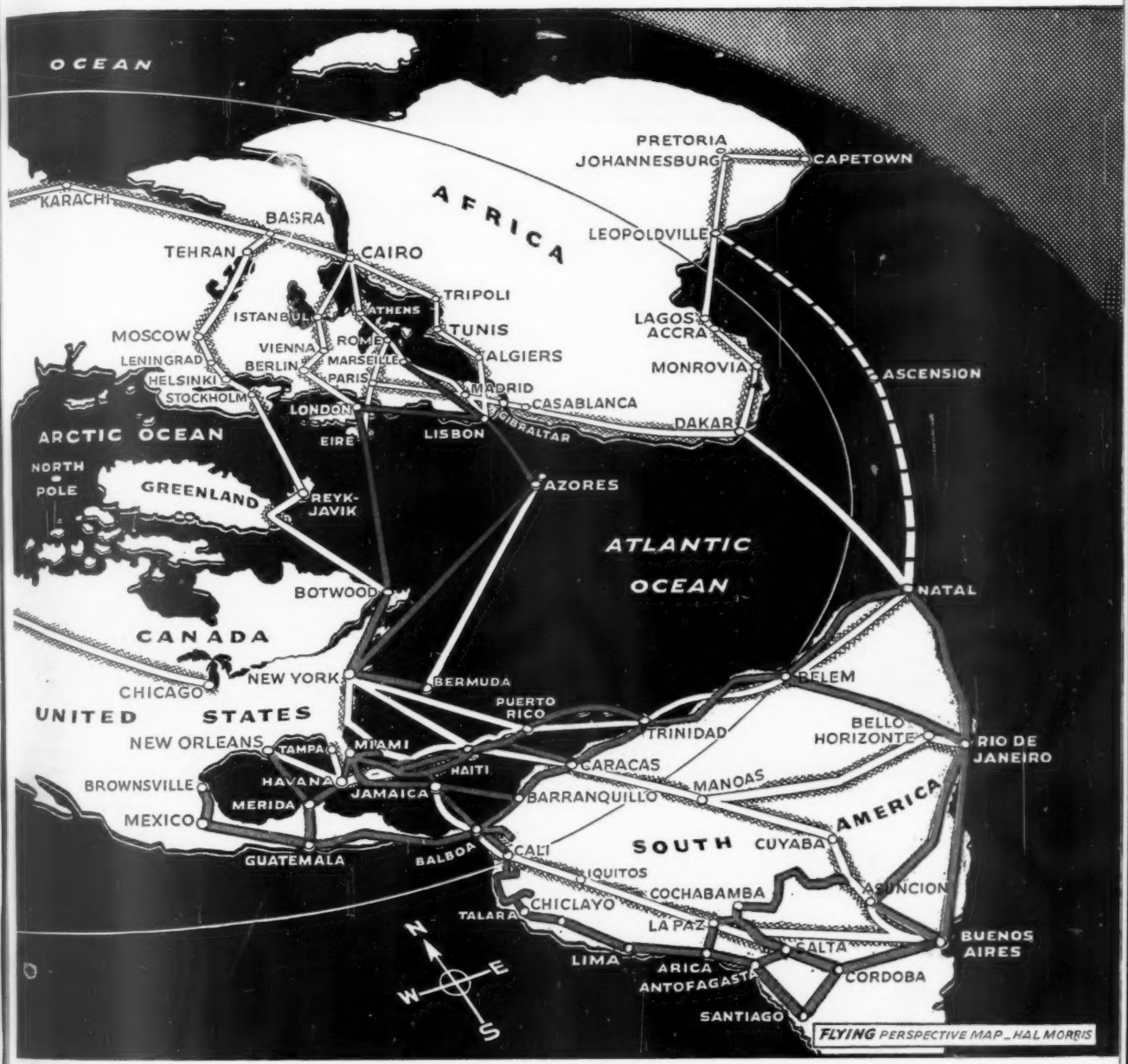
AMERICA'S WORLD

By CHARLES WILSON

Based on a thorough economic analysis, the United States has approved detailed routes for its post-war international airlines.

PRESIDENT ROOSEVELT studied the map on which were drawn 140,000 miles of air routes, listened to his visitors' explanations, asked a few questions—and ordered full speed ahead.

His conferees included Adolf Berle, Jr., Assistant Secretary of State; L. Welch Pogue, Chairman of the Civil Aeronautics Board; and Sen. Bennett Champ Clark, chairman of the Senate Commerce Committee's aviation sub-committee.



AIR ROUTES ☆ ☆ ☆

America was now ready to tell the world precisely what international air routes it expects to fly after the war. The CAB promptly made the map public property. The State Department intensified its discussions with foreign countries and a short time later came out publicly favoring "immediate establishment of provisional world air routes and services which would operate during a transitional period."

Thus were laid the foundations for the conference on world airways among more than 50 countries which has recently been under way in Chicago.

The first announcement of the routes came on June 14, 1944. To understand the significance of the day, it is necessary to recall something of the atmosphere of early 1943 when work was first begun on America's post-war air policy.

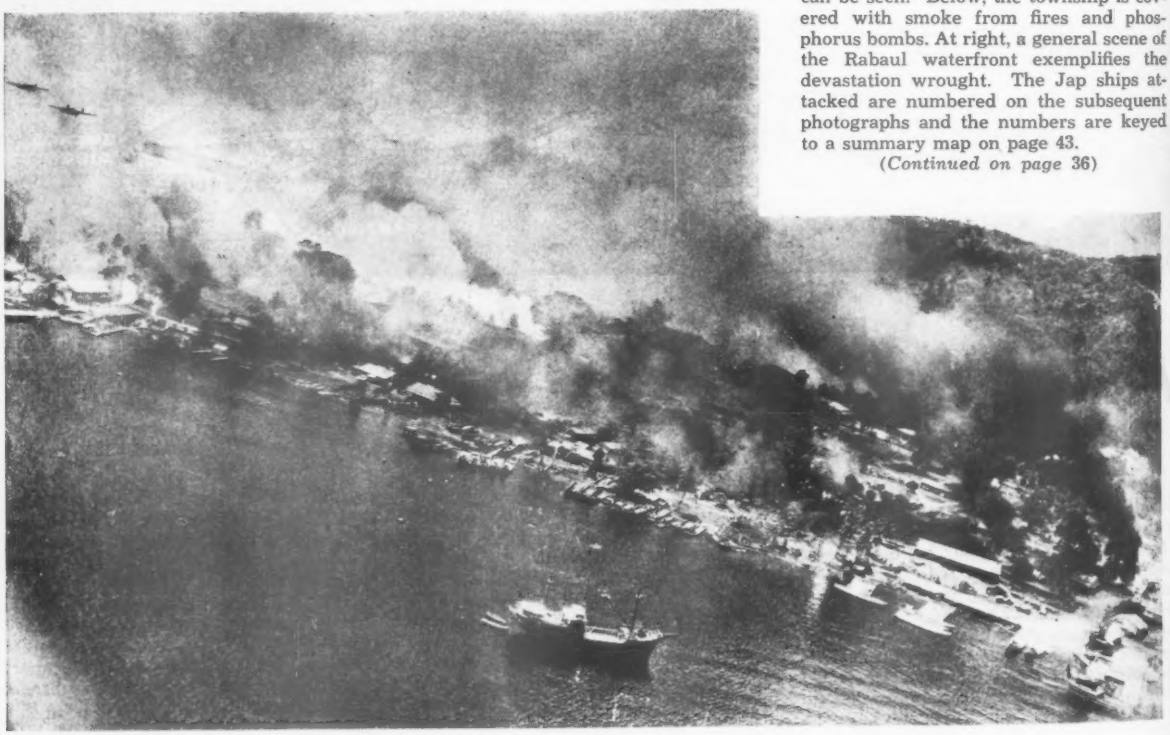
Clare Luce was making "globaloney" popular, and it was considered fashionable to yell that America lacked an air policy whereas every other air-minded nation had one.

Adolf Berle, Jr., top State Department aviation official, was causing the air transport business some sleepless nights. They believed their efficient service as contract operators for the Army Air Transport Command and the Naval Air Transport

(*Continued on page 92*)

12 MINUTES OF HELL

Mitchell bombers with Lightning fighter cover destroyed or damaged 114,572 tons of Japanese shipping in a concentrated attack on the well-defended harbor at Rabaul, New Britain.



IN 12 brief minutes on November 2, 1943, the Fifth Air Force destroyed or damaged 114,572 tons of enemy shipping and destroyed 69 enemy aircraft in combat and 16 planes on the ground at Rabaul, New Britain. All this havoc was wrought with a loss of only nine American bombers and 10 American fighters.

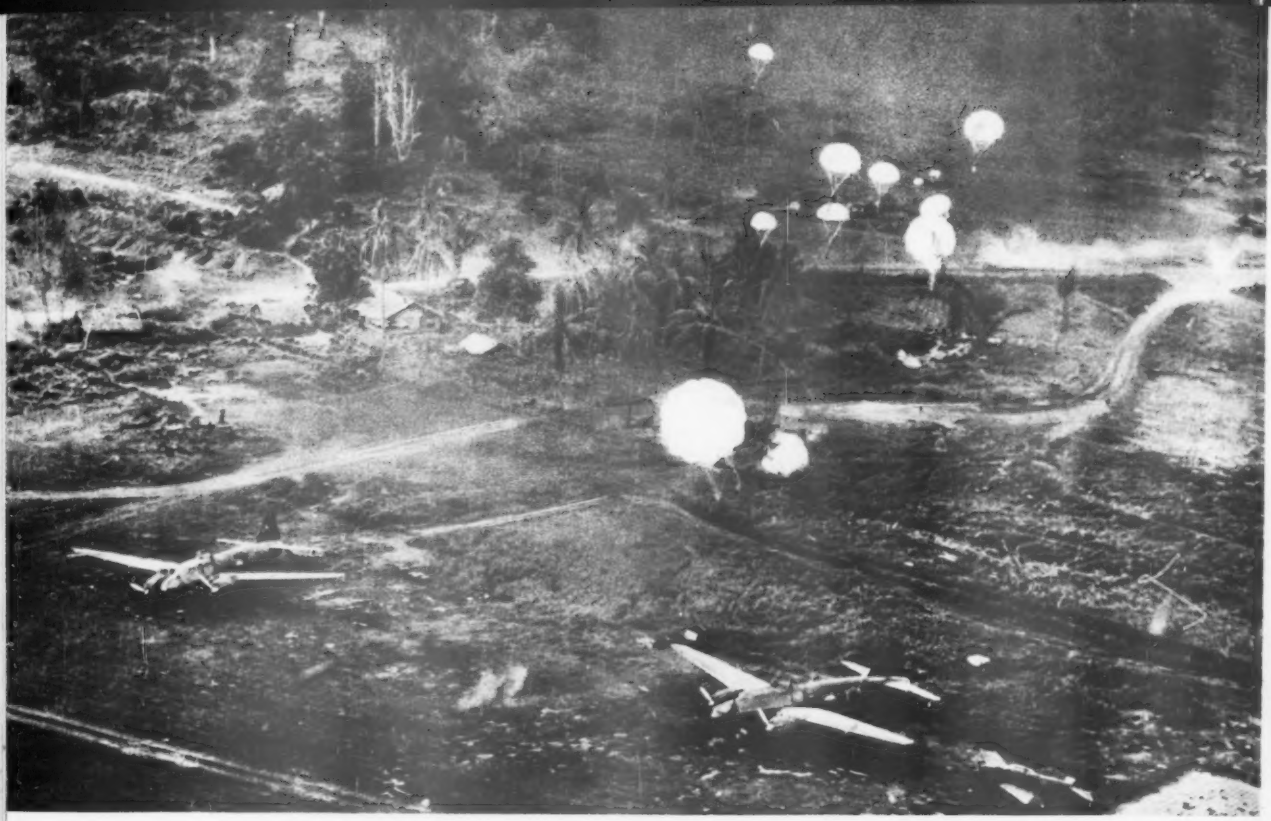
Forty-one Japanese ships lay at anchor in the superb harbor, surrounded by low mountains and flanked by the volcanoes of Vulcan and Matupi. This nearly landlocked harbor, however, proved a trap for the Jap ships anchored there.

The amazing pictorial story of the raid is told here for the first time in any magazine. Virtually the entire operation was photographed by cameramen in bombers and fighter planes at break-neck speeds in the midst of attacking and being attacked. The result is the most complete photographic record of such an operation so far released by the armed services.

At left, the attack begins with phosphorus smoke bombs. Lakunai airdrome is being covered with dense smoke which will soon blot out the harbor from defense shore batteries. On the airfield itself Jap aircraft—mostly Topsy transports—still can be seen. Below, the township is covered with smoke from fires and phosphorus bombs. At right, a general scene of the Rabaul waterfront exemplifies the devastation wrought. The Jap ships attacked are numbered on the subsequent photographs and the numbers are keyed to a summary map on page 43.

(*Continued on page* 36)

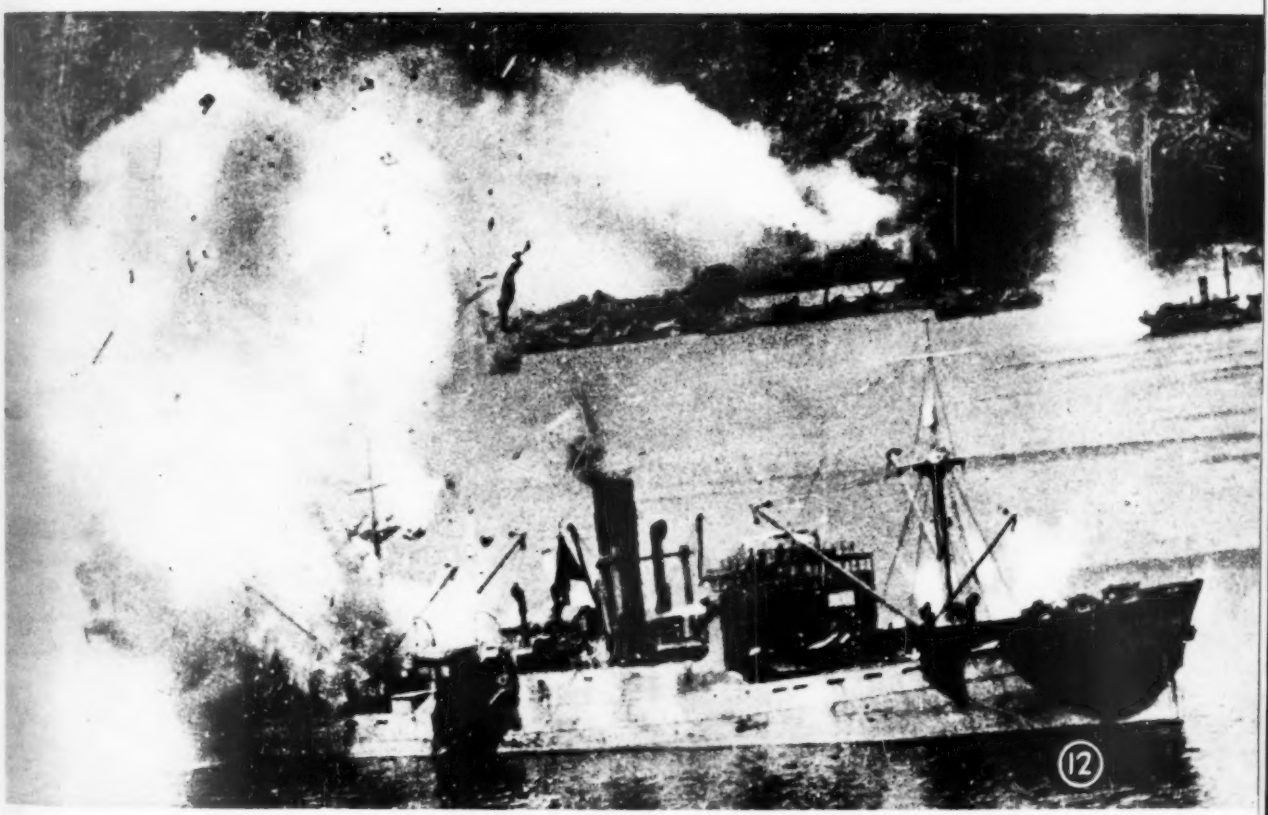
"A scene of utter destruction . . ."



"We hit Lakunai with para-frags and smoke . . ."

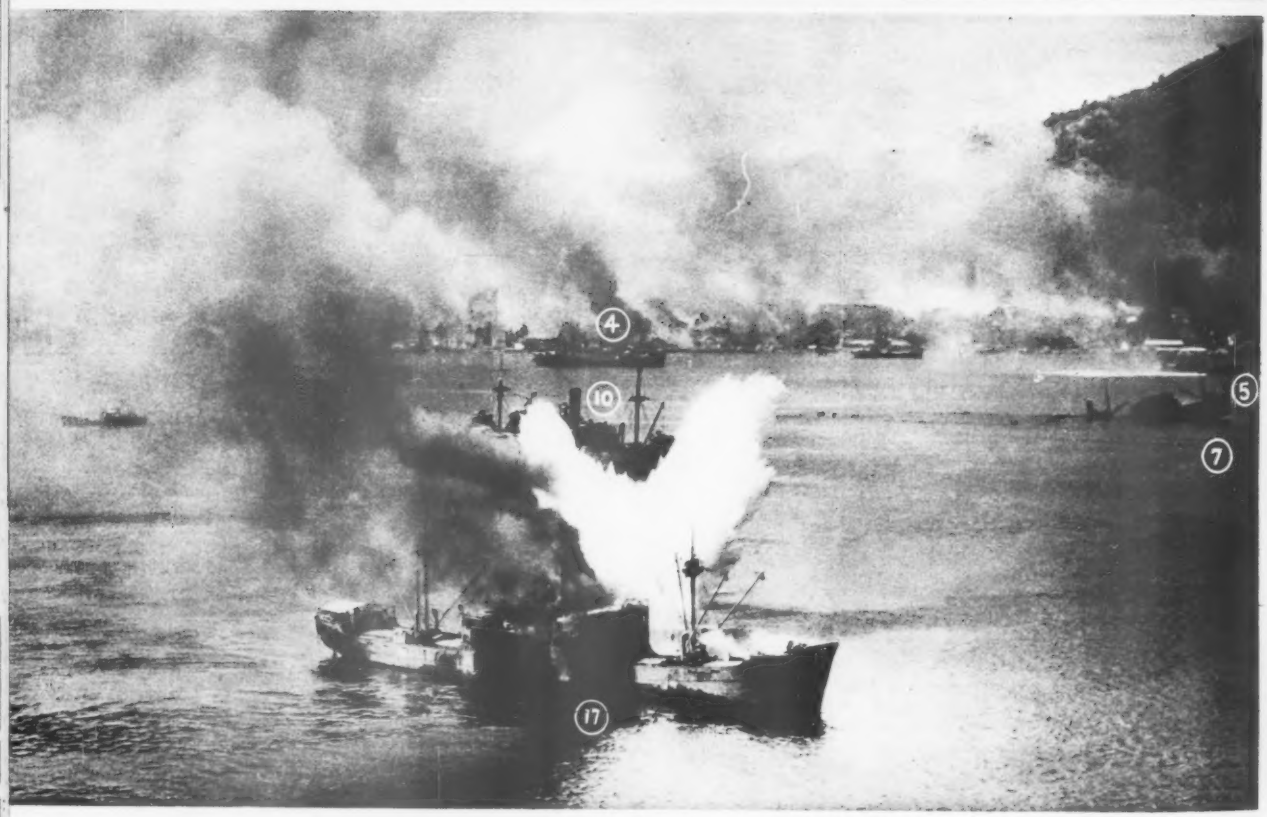
(*Continued from page* 34)

After smoke bombs had been dropped to hide as much of the harbor as possible from shore batteries, one group of attacking planes aimed at neutralizing Jap airfields and antiaircraft. Fighter planes caught on the ground were heavily strafed and bombed. In top picture, a low-level attack is being made by parachute fragmentation and phosphorus bombs. A few seconds later (bottom), one of the latter had exploded. Strafing silenced the Jap ground positions. The two Bettys and a Zeke visible here were part of 16 planes destroyed on the ground.



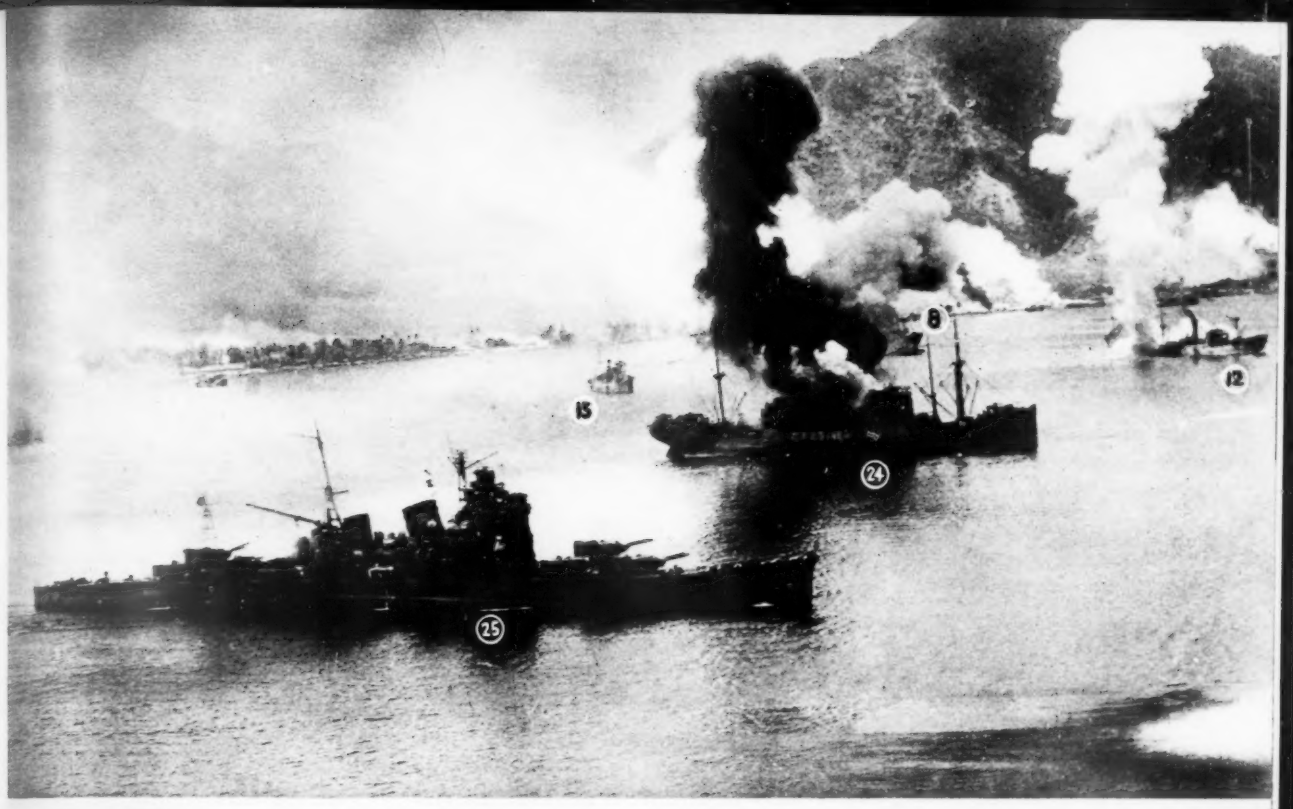
"Attacking below masthead height . . ."

"Attacking below masthead height," said Lieut. Rix Rutland, "we loosed our bombs from less than 50 feet against all enemy merchantmen which were objectives of this squadron." Note on ship above (6), captain and executive officer on bridge. In lower picture, debris is flying from a 1,000-pound bomb hit scored squarely upon a 4,217-ton freighter. F/O K. R. Ladd told intelligence officers: ". . . my gunner reported debris filled the water and sky almost immediately. We strafed anti-aircraft positions near Vulcan Crater, a radar station, and three Zekes and four Bettys we found on the Vunakanau airdrome."



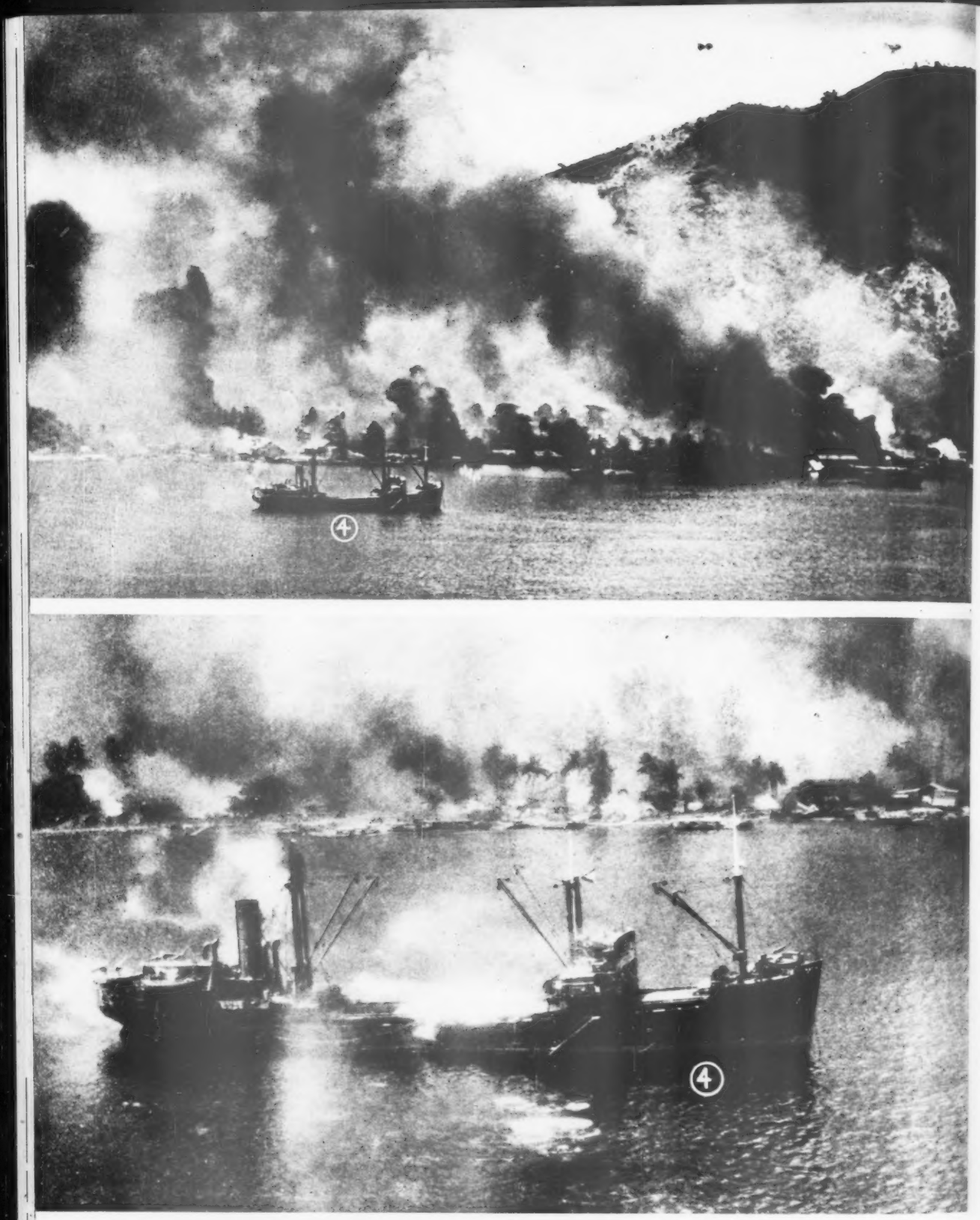
"The objective broke into flames . . ."

Here another 4,100-ton freighter receives a direct hit amidships. The bomb was dropped from 150 feet, blew debris high and started a large fire. This remarkable sequence shows consecutive photos of the hit. "I began my run immediately after we entered the harbor area, strafing the ship heavily," said Maj. John P. Henebry, commander of the Simpson Harbor attackers. "I believe some fires started before I dropped my bombs. I pulled up sharply directly amidships and dropped one 1,000-pound bomb. The objective broke into flames immediately and appeared to be seriously damaged if not in a sinking condition."



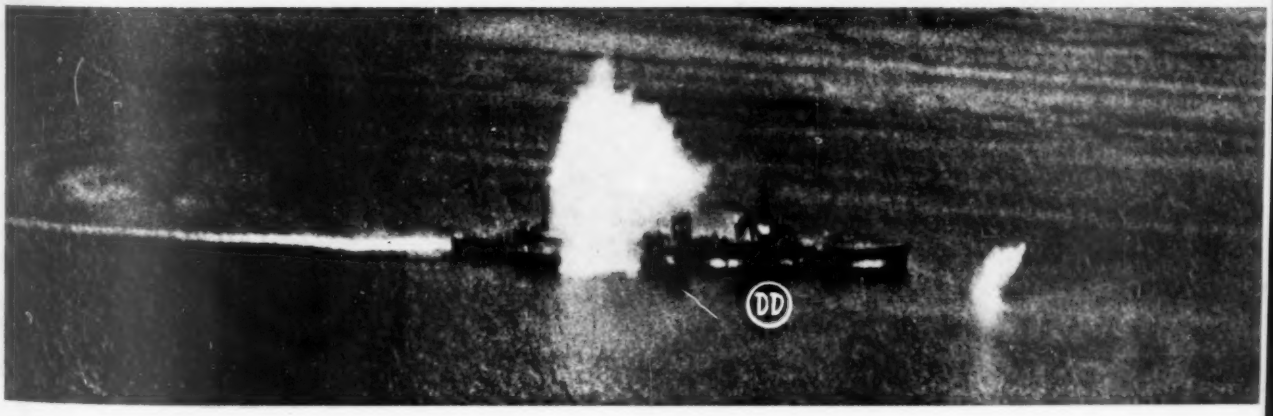
"A crippling hit was observed . . ."

A *Nachi*-class heavy cruiser (25), most formidable of the war vessels in Simpson Harbor, gathers headway in an attempt to escape. F/O Jack K. Harrington reported: "I was forced to make the approach while climbing, because the crater was directly in my path. Consequently I was unable to strafe the decks and my co-pilot dropped a 1,000-pound bomb on it when our altimeter read 500 feet. The bomb . . . hit the side . . . just aft of amidships. The explosion appeared to roll the cruiser on its side." Note explosion on the stern of the ship in the background (12). Below, a 10,380-ton transport (24) is left listed and burning.



"Strafing, we riddled the freighter . . ."

This is the battle that .50's won. In the final stages of the attack, having already loosed their bombs on shipping targets, the *Mitchells* launched strafing attacks on this freighter (4) of the 1,950-ton *Gosei Maru* class. Flying three abreast, the *Mitchells* levelled their guns against the freighter while three two-gun turrets covered their escape. Inflammable cargo in the hold amidships was set ablaze by the strafing, as the lower photo indicates. Such strafing has enormous destructive effect in forward fire, even against the steel plating of merchant ships. In the background, the town is blazing furiously.



"The vessel was later beached . . ."

Three of Japan's most effective merchant ships shown here were seriously damaged. They are the *Naruto*, an 8,500-ton tanker (30), a 10,000-ton tanker (31), and a 3,800-ton merchant vessel (32), under attack here. "I could not strafe this vessel," reported Capt. Harvey Minor, "but straightened out and, at my signal, the co-pilot dropped two 1,000-pound bombs, the second by accident. The first hit squarely into the ship at the waterline, while the second skipped over and exploded just beyond the transport. It was later beached." Below, a destroyer (DD) is attacked and damaged by a 1,000-pound demolition bomb.

"Hugging the treetops, we escaped . . ."

A large enemy minelayer (27) is strafed and bombed as this *Mitchell* completes its run over the outer fringes of Simpson Harbor. Note the volcanic islet at left. Such islets in this harbor are centers of antiaircraft guns set up to protect the shipping concentrated there. . . . And now home. "Hugging the treetops, we escaped from Simpson Harbor to the southeast. Vulcan volcano, lined with antiaircraft guns, and heavy cruisers in Simpson Harbor and Keravia Bay kept up steady fire. Eight Zeros attempted to intercept us near Vunakanau airdrome," read one report. The mission cost us 19 planes and 44 airmen.

"These were the results . . ."

1. Merchant Vessel, 3,800 tons. Three 1,000-lb. bombs, strafed. DAMAGED

5. Naval Aux., Hayasaki, 1,500 tons. Two 1,000-lb. bombs, strafed. DAMAGED

4. Merchant Vessel, Gosei Maru-class, 1,950 tons. Two 1,000-lb. bombs, heavily strafed, decks afire. DESTROYED

8. Merchant Vessel, Tokyo Maru, 6,485 tons. Three 1,000-lb. bombs. BADLY DAMAGED

15. Merchant Vessel, 3,800 tons. Heavily strafed. DAMAGED

9. Merchant Vessel, 3,800 tons. Strafed. DAMAGED

14. Subtender, Chogei, 5,160 tons. Heavily strafed. DAMAGED

12. Merchant Vessel, Hokuyo Maru, 4,217 tons. One 1,000-lb. bomb Other unobserved hits. DESTROYED

24. Transport, Hakusan Maru, 10,380 tons. Two 500-lb. bombs, strafed. BADLY DAMAGED

26. Destroyer Tender, Yamibiko Maru, 6,798 tons. Two 1,000-lb. bombs. DAMAGED

25. Heavy Cruiser, Nachi Class, 10,000 tons. Two 1,000-lb. bombs. DAMAGED

27. Minecraft, 800 tons. Two 1,000-lb. bombs, strafed. DAMAGED

29. Merchant Vessel, Mitakesan Maru, 4,442 tons. One 1,000-lb. bomb, strafed. DAMAGED

30. Tanker, Naruto, 8,500 tons. Strafed. DAMAGED

32. Merchant Vessel, 3,800 tons. Three 1,000-lb. bombs, strafed. BADLY DAMAGED

6. Naval Aux., Hayasaki Class, 1,500 tons. One 1,000-lb. bomb, strafed. BADLY DAMAGED

2. Merchant Vessel, 500 tons. Heavily strafed. DAMAGED

3. Merchant Vessel, 500 tons. Two bombs, heavily strafed. DAMAGED

7. Merchant Vessel, Haruna Maru, 1,500 tons. Four 1,000-lb. bombs, strafed. DESTROYED AND SUNK

11. Minecraft, 800 tons. One 1,000-lb. bomb, strafed. DESTROYED

13. Destroyer, 1,500 tons. One 1,000-lb. bomb. DESTROYED

10. Merchant Vessel, Lyons Maru, 7,000 tons. One 1,000-lb. bomb; two 1,000-lb. bombs possible, strafed. DAMAGED

16. Destroyer, 1,500 tons. One 1,000-lb. bomb, strafed. DAMAGED

17. Merchant Vessel, 4,100 tons. Five 1,000-lb. bombs, heavily strafed. DAMAGED

19. Merchant Vessel, Onoe Maru, 6,667 tons. Five 1,000-lb. bombs, heavily strafed. DAMAGED

21. Destroyer, 1,500 tons. Three 1,000-lb. bombs, heavily strafed. DAMAGED

41. Merchant Vessel, 1,000 tons. Bombed, strafed. DESTROYED

40. Tug, 500 tons. One 1,000-lb. bomb, strafed. DESTROYED

31. Tanker, 10,000 tons. Heavily strafed. DAMAGED

33. Minecraft, 800 tons. Strafed. DAMAGED

In addition to 114,572 tons of Jap shipping destroyed or damaged, 69 enemy aircraft were destroyed in combat and 16 more were destroyed on the ground.

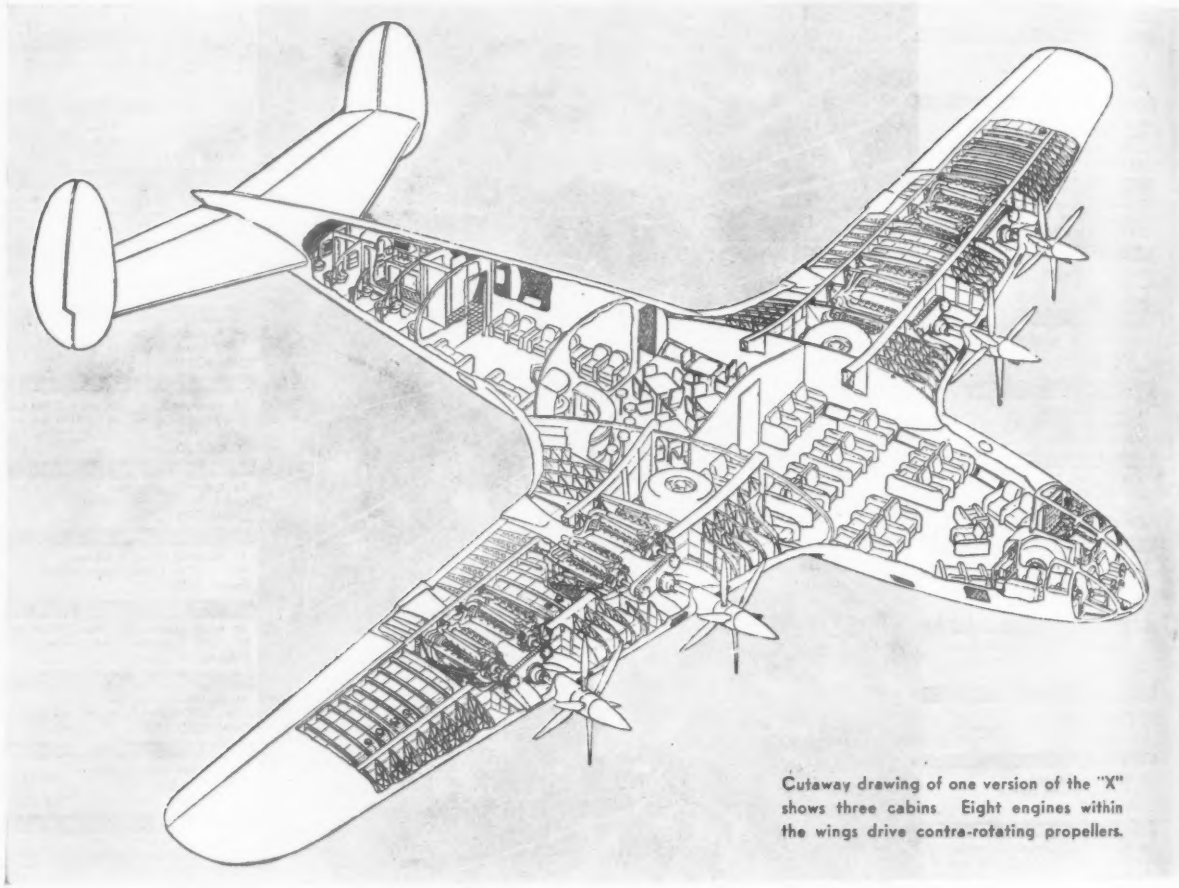
"I consider this one of the major victories of the Pacific war. But the Japanese Air Force is not yet destroyed. The attack will continue."

—From report of Commanding General, Advanced Echelon, Fifth Air Force, to Commanding General, Fifth Air Force.

". . . and this was the cost to us."

Nine bombers	Four bomber crewmen killed
Fourteen bomber officers missing	Ten fighter planes
Fourteen bomber crewmen missing	Eight fighter pilots missing
Four bomber officers killed	A total of 44 men killed or missing

BRITISH SUPER TRANSPORT



Cutaway drawing of one version of the "X" shows three cabins. Eight engines within the wings drive contra-rotating propellers.

The Miles "X" is a basic airplane design which can be used as a short, medium or long-range transport or converted to a bomber.

NEARLY every day London newspapers reveal some of the "secrets" of Britain's post-war civil planes. As these innovations in propulsion and design become known, and parliamentary debates on the future of aviation industries go into official records, any doubts American observers might have about Britain holding her own in the air after the war are speedily dispelled. The British have ambitious plans.

Before going into particulars on one of the most revolutionary new types of planes, here are seven other types ready for production as described in Lord Beaverbrook's daily *Express:*

A transatlantic land plane weighing over 100 tons and carrying 50 passengers and two tons of mail at 250 m.p.h.

A land plane of about 50 tons all-up weight capable of operating the North Atlantic route with an interim stop at Newfoundland and having a pressure cabin.

A four-engined aircraft of over 30 tons all-up weight, also pressurized, for trunk routes and intermediate stages. This will carry 12 passengers and luggage at 220 m.p.h.

A twin-engined machine of nearly 20 tons weight, also pressurized, capable of carrying 30 passengers in European service.

A 14-passenger landplane for use in Britain and on feeder lines overseas.

A twin-engined, four-ton air taxi for eight passengers.

A jet-propelled transatlantic airliner which, in speed, will "far outclass any civil machine now in operation." The quotes are the words of Sir Archibald Sinclair, air minister

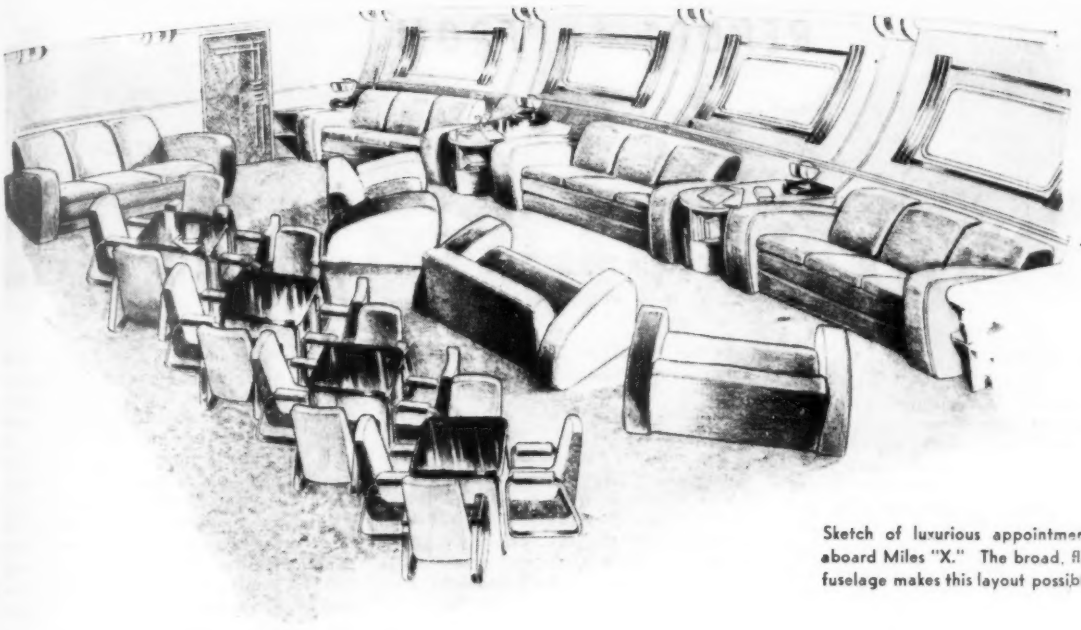
From this list it is evident that the British are thinking, not only in long-range terms but in terms of short hauls and even taxi-length jumps that may turn out to be the bread and butter of post-war aviation.

And going a step further, it can now be revealed that Britain has a basic plane design which can be used for short, medium and long range service, for bomber or troop transport use now and for civil passenger or cargo use later.

This design includes an unorthodox system of contra-rotating propellers.

So far the plane is known as the Miles "X," after its designer, F. G. Miles. Miles is one of Britain's foremost aeronautical engineers and his theories on aircraft and airport construction are listened to with deep respect by aviation experts throughout the world.

With its many innovations, the "X" might be classed with other revolutionary aircraft which have appeared from time



Sketch of luxurious appointments aboard Miles "X." The broad, flat fuselage makes this layout possible.

time in British aviation to leave contemporary types far behind. These included the Bristol *Fighter*, the Fairey *Fox*, the De Havilland *Mosquito*, the supermarine *Spitfire* and the Avro *Lancaster*.

The general layout of the design was first conceived in 1936, and research on it has continued during the past eight years. Wind tunnel tests have been made and a flying scale model has been built and flown successfully. Valuable data was gained and theories confirmed. Today Miles is ready to stake his reputation and his future on the "X."

In view of almost daily modifications in combat aircraft, it was thought that research for the largest type "X" could be extended and completed more readily if an exact one-third scale flying model were built first. Thus comprehensive flight trials could be made and data acquired during the actual design and construction of the full-size prototype.

The full-scale plane would be built in stages to allow for revision in the event of any new discovery that might be made.

Although the "X" is intended primarily as the forerunner of a series of multi-engined airliners which will operate over the world's peace-time air routes, it could be used efficiently as a bomber or as a military transport to move men and equipment. These factors were considered in mapping out the design and development program which hinges directly on tests which are projected for the one-third scale model.

The scale model would be of wooden construction and it is estimated that it could be completed in nine months during the same time the design of the full size plane could be proceeding. The main particulars of the flying scale model may be compared with those of the true prototype as follows:

Three-view silhouette of projected Miles "X" emphasizes the broad, flat fuselage and the high twin-ruddered tail

SCALE MODEL

Span—50 feet.
Length—36 ft. 8 in.
Gross wing area—261 square feet.
Aspect ratio—9.6.
Airfoil—18 per cent—15 per cent N. A. C. A. lamina: flow section.
All-up weight—6,100 pounds.
Wing loading at take-off—23½ pounds per sq. ft.

MILES "X" PROTOTYPE

Span—150 feet.
Length—110 feet.
Gross wing area—2,350 square feet.
Aspect ratio—9.6.
Airfoil—18 per cent—15 per cent N. A. C. A. laminar flow section.
Engines—8 Rolls-Royce.
Loaded weight—165,000 pounds.
Wing loading at take-off—70.2 pounds per sq. ft.
Max. speed (transport)—425 m.p.h. at 16,000 feet.
Max. cruising speed (transport) — 350 m.p.h. at 16,000 feet.
Max. cruising speed (bomber) — 400 m.p.h. at 16,000 feet.
Initial climb—1,500 feet per minute.
Run to take-off—900 yards.
Distance to clear 50 ft.—1,350 yards.

(*Continued on page* 160)

Wonder Plane

A fare of $96 one-way to Hawaii was proposed by Pan American at the West Coast hearings on post-war air routes to the Hawaiian Islands, so the other day we went over to Commerce and asked Lawrence J. Kosters, CAB examiner on the case, how come. . . . He said that the figure was right, but Pan Am had qualified it. Said they could do it if they had no competition and when they could fly a two-deck 108-place mystery plane they called the "9." They also talked about a larger "10." Until the planes are ready —the "9" possibly in '45, the "10" in '46— Pan Am proposes to fly known models at higher rates. . . . Inquiry elsewhere revealed that the airline offered aircraft builders a $50,000 bonus in January, 1940, for a model answering the description of the "9" as introduced into the West Coast testimony; and that Lockheed is today working on a super-*Constellation* answering the same descriptions [probably the *Constitution*, mentioned in the September 28 issue of the British magazine Flight]. . . . Grossing 184,000 pounds—the original *Constellation* grossed about 80,000—the plane is said to have a pressurized cabin and cruise at 330 m.p.h. . . . The West Coast-Hawaiian rate is the lowest over-ocean air transport rate in history, says Pan Am—less than 4 cents per mile. No. 1 question in the minds of commercial operators about the "little" *Constellation* that flew across the continent a few months back in 6 hr., 57 min. was not whether it was faster than a *Zero*, but whether it would pay off in commercial operation. Answer to that question in a rousing affirmative may be indicated in Pan Am's west coast rate offer—an answer which might also well revolutionize thinking in connection with a great many of the foreign routes now under consideration by the Board.

Hawaiian Case

Peculiarly enough, Pan American is not applying for a West Coast-Hawaii route. It is merely an intervener. Pan Am says it is already running a service to Hawaii —nobody should trespass. . . . Typical of many of the cases being considered by the Board, there are as many interveners as there are applicants for the Hawaiian routes. The ports of Seattle and Portland are intervening because they think they are as important as San Francisco and Los Angeles to post-war island air traffic. The Department of Justice is intervening to watch Hawaiian monopolistic steamship and other interests. The U. S. Maritime Commission is aboard, watching out for steamship interests, and even the Department of the Interior was scheduled to be in on the hearings, although they didn't show up. . . . Actual applicants include Hawaiian Airlines Limited, Matson Navigation Company, Northwest Airlines, Western Air Lines, United, and Ryan interests represented by the Ryan School of Aeronautics. . . . Five applicants want to fly between Los Angeles and Honolulu, five from San Francisco, two from Portland, two from Seattle. Hearings were completed in September, briefs are due from the lines this month; but a decision is not expected before spring, conflicting interests being what they are and the Board being as busy as it is. . . . Aside from Pan Am's bomb-shell $96 rate, one-way figures ranged around $150-$175 with DC-4's the favorite plane. Perhaps the most startling consensus was that air passenger travel post-war will run more than 100,000 annually over the route—twice the 1939 passenger traffic by sea.

Hub of the Universe

Applications for routes into Washington, D. C., submitted by six U.S. airlines, point toward equally ambitious post-war transport plans on the east coast. It is reasonable to suppose that out of the international conference this month will come requests for landing rights from at least that many more foreign operators. . . . Harbinger of the foreign operators is Trans-Oceanic Airlines, Inc., recently organized by a group of British military and transport pilots who want to base their U.S. activities in Washington. . . . U.S. operators with applications for foreign service out of Washington before CAB include American, American Export, Eastern, Pennsylvania, United, and TWA. TWA plans call for *Constellations* on a 38-hour service to the most distant stops on their world route. DC-3's and DC-4's are proposed by other lines, while Pan Am, applying for a base in Baltimore, plans to use DC-7's. . . . What applications will result in certificates is a question, but from all indications there will be plenty of planes from the Capital to anywhere. Listed as destination points in the applications are stops like London, Berlin, Athens, Cairo, Bagdad, Calcutta, Chungking, Tokio, Paramushiro, Attu and Kiska. Al-l-l aboard. . . .

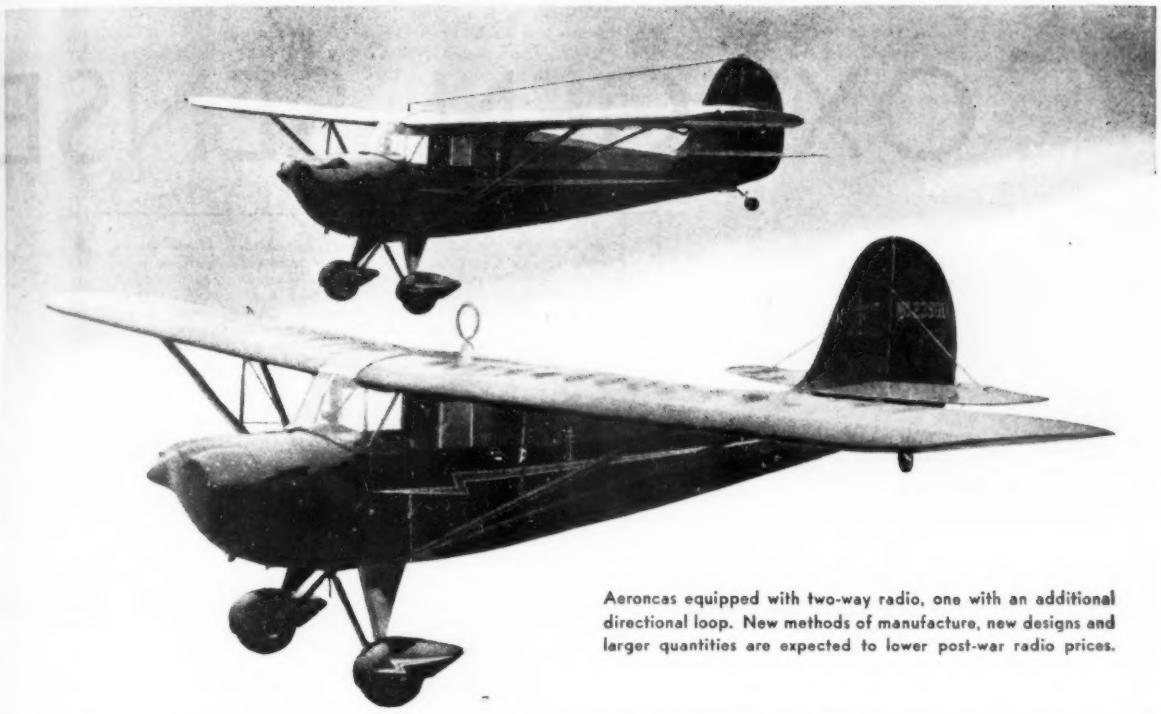
International Conference

Careful study of the agenda of the International Civil Aviation Conference which began among representatives of 50 nations in Chicago, November 1, leads to the conclusion that, if the conference succeeds, the foundations for world air commerce for years to come will be laid. At least that's the feeling among many Washington higher-ups familiar with the situation. . . . Three major problems are up for consideration—world air routes which may be established on a provisional basis pending peace, determination of provisional technical standards and procedures, and plans toward organizing a permanent international aeronautical body. . . . . High significance may be attached to the fact that before anything lasting is nailed down, *after* the shooting stops, planes will be flying over specified routes according to specified rules and procedures—all to be determined under the provisional agreements. Before permanent procedures are determined, world air transport may be a going concern—and it is far more difficult to amend the operations of a going concern than to lay down the rules from scratch. . . . A permanent pattern for post-war air commerce, in sum, may be determined at the current meetings, "provisional" though the arrangements are said to be.

Trouble Spots

This is not to say that Assistant Secretary of State Adolf A. Berle, Jr., and his associates are going to m.c. a love feast this month. Scores of knotty problems have dogged him since the conference was announced early in September, and the nearer it comes to opening day, the more the troubles. . . . Scene for the meeting was not the least of these. Washington, overcrowded, was early eliminated as the place and it was less than a month before meeting time that a spot was found to accommodate some 250 delegates and as many more assistants, experts, secretaries and factotums and at the same time offer enough rapid communication and travel facilities to suit the high-pressure demands of the convention membership. . . . As the conference starts, more grave problems are arising. Argentina, top-ranking South American air terminal, was not invited because of Nazi affiliations. . . . Russia, silent partner so far in Allied dealings on post-war problems, is still noncommittal on what it wants. . . . England, taken aback at the quickness with which the conference was set up, is also wondering about U.S. supremacy in transport production. . . . In specifying com-

(*Continued on page* 118)



Aeroncas equipped with two-way radio, one with an additional directional loop. New methods of manufacture, new designs and larger quantities are expected to lower post-war radio prices.

Make Way for AIRCRAFT RADIO

By
SIDNEY NESBITT
Sales Manager, Radio Division, Lear Incorporated

Aircraft radio prices are probably coming down, but what about simplifying Federal regulations?

BEFORE the war, excessive legislation and over-control of aircraft radio plus high cost was frequently the cause of a private flyer foregoing the added safety and comfort of two-way radio for his airplane.

Let us take the hypothetical case of a private pilot who owned an airplane in the cross-country class—a two-place cabin monoplane in the range where payload permits the installation of a two-way radio. Upon inquiry as to price, make, type and operation he was confronted with the following:

Price—anywhere from $300 to $600 installed, including bonding and shielding. Make—choice of only about three good sets. The type—usually transmitter of between one-half to 10-watt output—with a receiver operating on the beacon band (200 to 400 KC) only. Sometimes he would splurge on a more expensive set with direction-finder loop, etc., in which case the price rose to $600 or $800. Since a private owner with an airplane costing around $2,000 to $3,000 new rarely wanted to sink another $800 into the deal, a radio priced at about $400 was usually the one selected.

So far so good, but when he came to install the radio he found himself confronted with the following Government requirements:

1. A radiotelephone operator's license.
2. A radio station license.
3. An entire new weight and balance calculation on his airplane and consequent relicensing.
4. Frequency checks that had to be made every six months to determine whether the transmitter crystals were on frequency.

The actual examination questions for the radiotelephone operator's license were not difficult. Most of these made common sense and, provided the prospective licensee prepared himself beforehand, he could usually whiz through his actual exams without much difficulty. The catch was, however, in knowing what the questions were going to be. If the private owner had not been fortunate enough in obtaining some pertinent study material beforehand he was out of luck.

Details such as fingerprints, producing one's birth certificate or naturalization papers, plus showing a "clean bill of health" with the police and FBI were all minor but essential for the license.

The prospective licensee had to turn up in person to write his exam. This was no problem for those situated in or near a city where the FCC had an office. But the plane owner who made his home and kept his airplane in a rural district far away from an FCC office had no alternative but to travel in to take his examination—and woe betide him if he came unprepared, for he would have to wait at least three months until he was again eligible to take the exam.

More recently the FCC inspectors traveled between the larger cities that did not have permanent offices. This helped some because the prospective licensee then had the opportunity to catch up with the inspector's itinerary and be on hand to sit his exam when the inspector arrived at the city nearest his home. The inspector's itinerary could be determined upon application in writing to the FCC, Washington, D. C. But if the inspector did not arrive in a certain city in accordance with his schedule that was just too bad—for the plane owner!

On the second requirement, the radio station license was the cause of more mental gymnastics than the average plane owner could cope with.

The application form contained around 26 questions pertaining to the technical aspects of his radio. He also had to answer several quite intimate questions concerning his family and business connections in addition to the technical questions. When he sent the application in to the FCC in Washington he rarely learned whether his application had been

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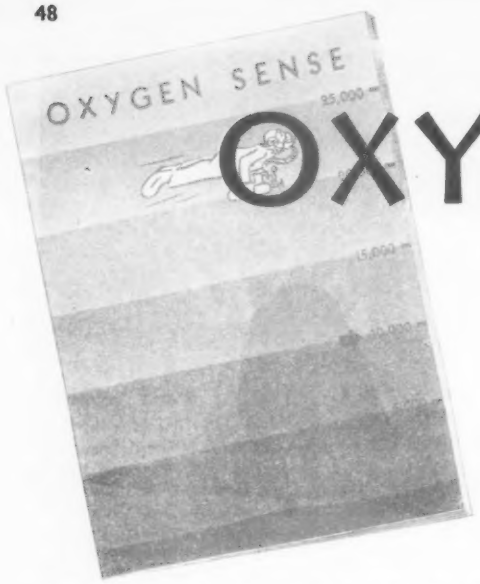


OXYGEN SENSE

Here is another in FLYING's series of condensations of the Navy's "Sense Manuals." Written by a group of talented professional writers, the "Sense Manuals" are outstanding among the training texts of the armed forces which, on the whole, have been distinguished by originality and readability. The interest of "Oxygen Sense" is enhanced by the drawings of Lieut. Comdr. Robert C. Osborn, creator of the Dilbert cartoons. A number of his drawings are reproduced here.

Lack of oxygen is like alcohol; you feel fine for a while—and then you're drunk.

IF YOU like to breathe, don't be self-conscious about it. The best medical opinion states definitely that breathing is not only normal—it's healthy. This has to be qualified, of course. Breathing water, illuminating gas, carbon monoxide, etc., is not healthy at all. Breathing air is what we're talking about—breathing enough air that contains enough oxygen.

Let's first take a look at the broad principle behind the relation of air and oxygen. There are a lot of misconceptions with regard to breathing and air—and we'll do well to knock them in the head right away.

In the first place, remember that the percentage of oxygen in the air is the same from sea level up to the atmosphere ceiling of 70,000 feet. Then, you ask, why worry up to that height?

Air is uniform—but air pressure is not, and that's the answer. Air is approximately 21 per cent oxygen, 78 per cent nitrogen, and one per cent inert gases—at sea level or when you're chasing a Jap bomber formation at 30,000 feet. But air is thicker near the ground. Less air at high altitudes—that's what you want to remember. So, of course, less oxygen.

To make the picture absolutely clear, imagine a huge pile of mixed straws, half of which are black and half white. The weight of the straws compresses those on the bottom more than those on the top—so a pitchfork full of straws from the bottom of the pile has many more straws in it than a fork full taken from the top—although the proportion of black and white straws will remain the same. Now, suppose you are going to stoke a fire with that straw and the white straws are the better and more important fuel. You'll have to add more white straws to a fork full from the top of the pile to obtain the same amount of heat as you'd get from a fork full taken from the bottom.

That's what your oxygen apparatus does for you—it adds more oxygen to the insufficient quantity of air available to you at high altitudes. The basic problem is no more complicated than that. Your body is the fire consuming the straw—and it needs an increase in the white straws, oxygen—as soon as you fly for any length of time above 10,000 feet.

Let your altimeter tell you when to turn on your oxygen supply, and don't rely on your own feelings in the matter. You can't feel the need for more oxygen as soon as it occurs—no matter how bright a pupil you were at school—so start using your equipment when your altimeter reading says so—and don't sneer at it and say, "Go on—I'm a tough guy. I feel fine."

Sure you feel fine. So does your drunken friend when you tell him he's had too much of the old stagger soup and shouldn't drive his car. Anoxia—lack of oxygen—like alcohol, gives you a false sense of exhilaration and self-confidence as one of its first symptoms. What it gives you later is a couple of cylinder heads between your vertebrae or a necklace made out of your landing gear.

So use oxygen:

1. When you're going to be between 10,000 and 12,000 feet for four hours or longer.

2. When you're going to be between 12,000 and 15,000 feet for two hours or longer.

3. At all times when you're going to be at 15,000 feet or over—no matter for how short a time!

4. In night flying use your oxygen from the ground up at all altitudes—all the time—to preserve maximum vision and efficiency and prevent night blindness.

Turn that oxygen on at the beginning of the above-stated periods, not at the end. In other words, when you get to 10,000 feet start using it—don't wait until you've been there four hours.

Remember, over 10,000 feet, all the time spent without using your oxygen equipment keeps making you less and less efficient.

Check and double check your oxygen hose connection. Make sure it's connected—but also make sure it's locked. It may

look fine, but you may be flying a one hoss shay and the vibration of your plane can shake it loose, without your being

aware of it. Remember—the first symptoms of anoxia are not apparent to you and by the time you feel the lack seriously and fumble around with blurred vision and drunken hands trying to reconnect your hose it's going to be too late.

First we'll tell you as graphically as we can about the troubles that come from lack of oxygen alone. Then we'll take up what happens to you if you haven't been living right in other directions.

Between 10,000 and 12,000 feet—after the safety point without using your oxygen equipment is passed—you get a headache and your reflexes and processes are dulled. You don't think very clearly, you don't see your dials very clearly. The beautiful co-ordination between your mind and your hands and feet on the controls begins to break down. You're a little clumsy and inefficient—although you may not be aware of it. This condition gets more aggravated and more severe as you stay there too long or move on up.

At 15,000 feet you get in the giggly, giddy stage of drunkenness—you react like a silly girl in a juke joint. Your heart pounds, your lips and fingernail roots are blue, your eyes blur—but you probably feel great and hilarious. You're a killer—you're a hot shot. You won't be a killer of Japs or Nazis in this condition—but you're a setup to do a swell job on yourself or your crew, and we're not kidding.

We're at 20,000 feet—and brother, you're really a mess now. Your vision is thick and dark—the little you can see is blurred and foggy and makes no sense. You can

barely hear your engine—your breathing is a struggle, your pulse is racing. But don't think this is going to warn you to shove that stick forward and dive out of danger. Because your judgment and perception of what's wrong are about as sharp and intelligent as those of a five-

year-old idiot. You don't know there's anything wrong—and if you have a faint idea something is not strictly on the level you don't care very much. You want to sleep, if you want anything. Sleep—feels—so—fine. Good night, brother.

At 25,000 feet this is the story: You collapse and will probably die in half an hour. If you're a fighter pilot and spin out of control while unconscious, it is barely possible for you to recover consciousness and pull out. But emphasize the word "barely" in that sentence—not the word "possible"—and don't place any bets.

The data on anoxia has been carefully gathered by the best scientific minds in aviation, both here and abroad. Here are a few related facts:

1. The cells of the brain and nervous system are generally affected by lack of oxygen before any symptoms appear—so that while you may think you are functioning 100 per cent you may not be.

2. Results of not following instructions: (a) You begin losing efficiency at 10,000 feet; (b) Your mental functions are impaired above 15,000 feet; (c) You are likely to faint over 20,000 feet; (d) You will definitely pass out over 25,000.

3. You have absolutely nothing to fear in high altitudes if you follow instructions completely and intelligently. Hundreds of pilots are up there every day.

4. Careful experiment and research has proven conclusively that there are no harmful effects from the use of oxygen at high altitudes.

Don't worry about the dangers of high-altitude flying if you've obeyed the rules

"I'd like some beer, some of those frankfurters, boiled cabbage, and—kerchoo! —some of those fine baked beans."

That's one thing you don't ever want to hear yourself saying to a waitress if you're due for a high-altitude trip in the next day or so. Or—"Let's have just one more drink before we turn in."

Because why?

Because:

1. Let's take the beer and the "one more drink." They're bad on two counts. First of all it's cold up there. It's about 55 below zero at 30,000 feet and remains at 55 all the way to 70,000. You wear special cold weather flying clothes, shoes, etc., but besides that your physical condition has a lot to do with your ability to resist those subzero temperatures. Alcohol breaks down your resistance to cold, even though it may make you feel warmer, and you'll be a lot more subject to frostbite, chills, numbness and so on if you've been drinking the night before than if you haven't.

Alcohol, of course, has a lot of other effects which don't help you under conditions such as you face in high altitude flying: your vision is not as keen; your heart and breathing are accelerated (and remember you're on oxygen!); your pores are opened due to raised skin tem-

perature; and your whole general body adjustment is depreciated.

Alcohol lowers your "service ceiling" anywhere from 3,000 to 6,000 feet.

2. Now the frankfurters, cabbage, and beans. These are all foods which create gas in the digestive tract, intestines, and stomach. (The gas in the carbonated highball and beer are just as harmful.)

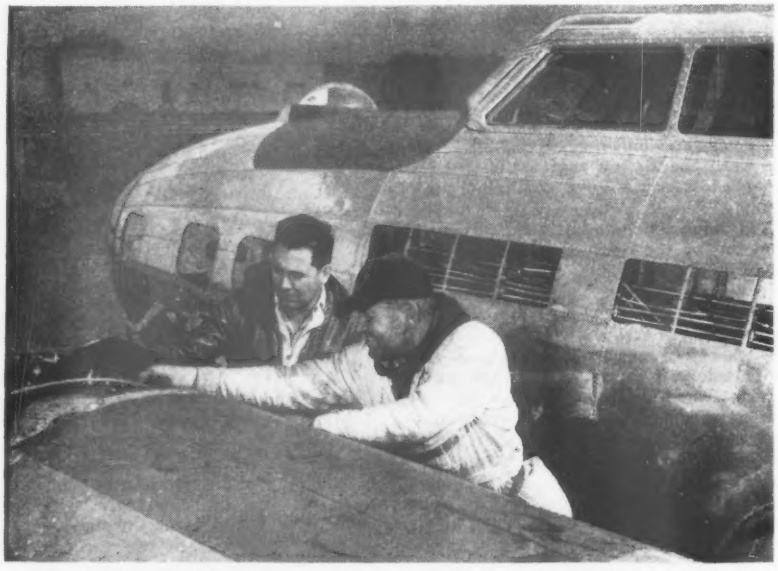
Why avoid excess gases in the abdomen

(*Continued on page* 124)

"Not one Flying Fortress lost on first flight" is the record set by crews who do the final check-up on the million-part bombers.

By WILLIAM W. PRESCOTT
Assistant chief, first-production crew, Lockheed Aircraft Corp.

Here's what happens to a Flying Fortress—from the time it rolls off production lines until pilot and test crew take over for the first production flight.



G. E. Summers (left), first-production crew chief, and the author check one of the four power plants of a Flying Fortress for a flaw which resulted in an inspector's "squawk."

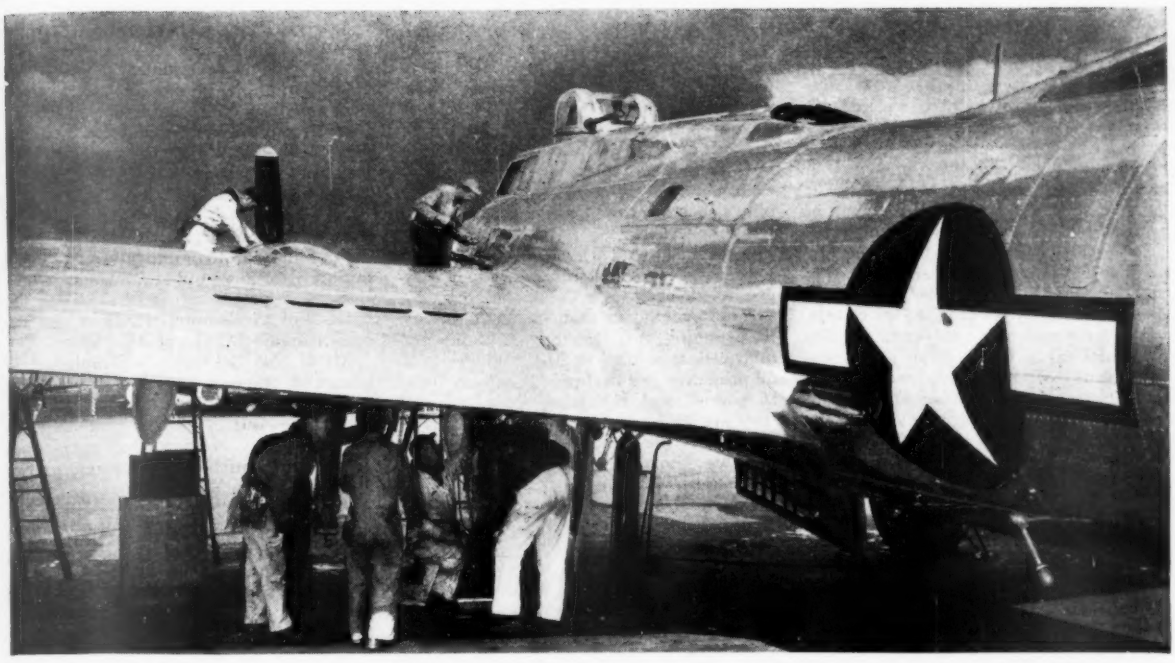
THERE'S a reason for everything—and especially for American plane performance. Working at the end of a production line which employs thousands of skilled workers, this reason is pretty clear to me. You see, I'm a member of one of the seven crews of eight men each who put the final touches on the B-17's—the *Flying Fortresses*—as the million-part bombers roll from the line. Until the pilot and co-pilot taxi out onto the runway at Burbank, the plane we have serviced has never been off the ground.

Yet, since Lockheed has been building the *Forts*, not one has been lost on first production, second production, or acceptance flights. This is the perfect tribute to the efficiency of those thousands, many without prior factory experience, who turn out one of the most complicated mechanisms produced by war-time industry.

A pre-war automobile mechanic, I went to work for Lockheed in 1942, scarcely knowing an elevator from a wing tank. My first job was washing the under side of the wings. That's tough, and dirty—the kind of a job the new man always gets.

In those days, preparing a *Flying Fortress* for first production flight required about two days. Today, the job is done in about four and one-half hours. The reasons: reduced need for changes and replacements, streamlined operating methods by all of the seven first production crews, greater familiarity with the airplane, fewer production bugs, increased "know how" of factory personnel, and engineering improvements. These improvements likewise have resulted in a first production flight time cut from approximately three hours to one hour. The Army acceptance flight which follows is also a one-hour hop.

Our eight-man first production crew



First-flight checkup, following delivery of plane to the field, is done by an eight-man crew of highly-trained aircraft mechanics.

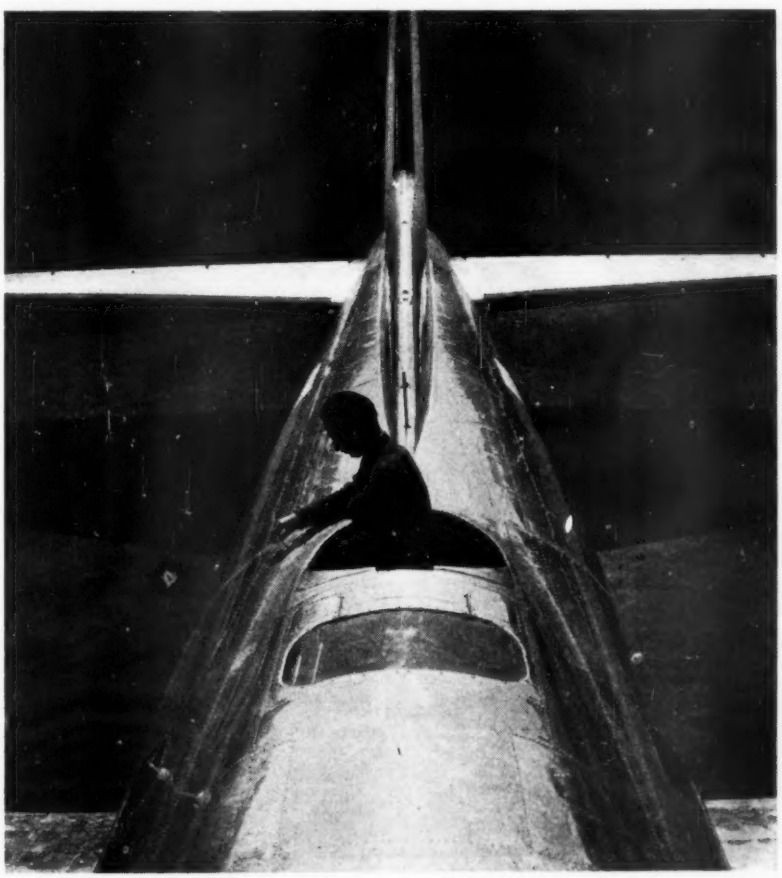
has G. E. Summers for chief. There are four engine men, a wing man whose big job is testing the free flow of fuel from tank to tank; two fuselage men, who work over that portion of the plane from nose to stinger, and one swing man, who is a jack-of-all-trades. In addition, we have a radio man, who works all during preparation for flight and makes the initial flight, and an electrician. The latter two are not members of our crew but are assigned to each plane from their own sections.

The big *Fort* comes off the production line towed by a tractor. It either goes to the paint shop, where special non-glare paint is applied to certain parts—the all-over camouflage job was eliminated recently—or to the firing range, where the guns are tested, or to the compass rose, where the compass is swung. No matter what the route, the *Fort* visits all three places, and finally is backed up into the production stall. Then, we go to work.

After all cowling and inspection plates are removed, we fuel up and start line, valve, and flow tests. The electrician and radio man report, and four engine men hit the engines. I usually take over engine one, the outboard port. All four engine men do the same things. Here's a part of the routine:

Pre-oil, install plugs, and service engine throughout. Check hose clamps, hydraulic lines, propeller governor lines, pre-set oil pressure and fuel pressures, check carburetor mixtures, check out primers, and check lines through nacelle, wings, and cockpit. Watch for leaks, cracks and dents. Service oil tanks. Adjust turbo. Keep eyes open for anything that doesn't look exactly right.

After these jobs are done—the wing, fuselage, and swing men have been doing their specific chores—everybody starts



Inspector T. L. Bigelow checks the antenna above the radio-gunner hatch. Correction of any flaw on which he registers a "squawk" is final step before plane is okayed for flight.

"working off squawks." On each plane are inspection check sheets. On these the inspector has made a note—a "squawk"—of what's wrong with that particular plane. When a "squawk" is worked off, we report it on the sheet and sign our names. Finally, we prime the oil pumps on our engines, clear away anything in the stall which might be blown over or against the safety screen at the rear of the area.

The engines are now ready for the low power run, requiring not over 35 inches of mercury at 2,350 r.p.m. The crew chief takes the co-pilot's seat. The mechanic, in the pilot's seat, starts the engines. The crew chief takes readings on all engine instruments. After an initial warm-up of five minutes the electrician mounts the wings, sets the reverse current relays for the generators, and adjusts the voltage regulators.

For the next 25 minutes, the motors are gradually sped up to 2,350 r.p.m.'s. Oil and fuel pressures are watched, propeller pitches are changed; ailerons, tabs, de-icer boots, and everything else come in for their share of attention.

Then comes the shut-down of the four engines. Oil is drained from the sumps and main tanks to be re-refined and used again. We clean all carburetor screens, lukenheimers, oil filters, and fuel filters. We re-set oil pressures to 80 pounds, if necessary, and fuel pressure to 15.5 pounds. Filter screens must be shown to the inspector. If there is a trace of metal, the cause must be found. Magnets in the sumps are checked. If the cause is found and cannot be remedied the engine is removed. If repairs are made, another inspection is necessary.

After the initial run-up we fill each oil tank with 35 gallons and add 800 gallons of gas to the main tanks. Again we go over the engines to be sure there are clearances between all lines, so that vibration can't cause a failure. Cables and hoses come in for the same attention. In the meantime the inspector has probably written down some new "squawks" to be worked off.

Now comes the final run-up. Its length depends on what shows up, but it usually lasts from 30 to 40 minutes. The stall is cleared. The crew chief gets into the pilot's seat this time and runs the engines while the mechanic takes the readings. The engines are warmed at from 1,000 to 1,200 revs for a few minutes; then they are idled back to 650. Some may be turning over faster than that, others may be coughing out. So the mechanics set mixtures and idles on their engines. If oil pressures and fuel pressures vary from 80 pounds and 15.5 pounds respectively, they are again re-set. Every one of us is thinking of the men who will fly this ship, and we know those pressures have to register correctly.

Engines are now run up to 2,000 r.p.m.'s. After a time they are dropped to idle again, while the vacuum pumps on engines 3 and 4 are set. The run-up advances to 2,350 r.p.m.'s. Props are feathered to check the governors. The mechanic gets out of the co-pilot's seat when the engines are again idled and the inspector takes his place. The inspector rechecks all readings, ascertaining that the vacuum is in the 3.75—4.25 range. Particular attention is paid the generators. The charging rate must be exactly right, and steady. A "wild" generator will boil over the acid in batteries in less than a minute, and the wings will be filled with a corrosive acid. This is the worst hazard of the ground run-in, and hours must be spent in cleaning up the mess.

Then comes the turbo run-up at full throttle—2,500 r.p.m.'s at 45 inches of mercury. Finally the engines are "cleared out" and dropped back to idle. The inspector again sees that they are idling properly. If he is satisfied, he "buys the run-up." Then, after determining that each engine is functioning perfectly, he "buys the engines" and orders the cowlings and inspection plates on.

While the crew chief and the inspector leave with all the records and charts to sign out the plane for flight, the crew goes through the plane once more from nose to stinger. Batteries are checked to be sure there was no boil. Controls, fitting, skin, and a hundred other things are examined minutely for any kind of failure or indication of approaching failure. Then all hands fall to cleaning windows and the rest of the *Fort*.

All of this has been accomplished in four and one-half hours, assuming that nothing radically wrong has materialized. Nine times out of ten, we find that the "squawks" are routine, that corrections and repairs can be made by one or two men in a matter of minutes.

While we are cleaning up the plane, the flight office has been notified and the pilot and co-pilot report. Rightly enough, their trust in us is tempered with caution. They spend between 10 minutes and half an hour going over the plane, inspecting everything that is visible to the eye. Three of our crew are entitled to fly on the first production flight—but only one at a time. The list includes Somers, Melvin Loken and myself, and the man selected is known as the flight mechanic. He is capable of taking care of anything which is remediable in the course of the one-hour flight. In addition, the mechanic who assisted on the low power run-up is taken along. With the radio man, this makes a crew of five.

We all try on our parachutes, make adjustments, and put them in some accessible place, just in case.

Engines are run up for five minutes. During this time, a final, triple-check is made. Then the pilot asks for clearance to taxi out for take-off. The big *Fort* lumbers out of the stall, starts to the head of the run-way for the first time. The flight engineer takes his place between the pilot and co-pilot's seats, watching every engine instrument. This is the big moment. The efforts of thousands of workers and nearly a third of a million dollars have gone into the making of this plane. If anything is wrong, it will probably show during the strain of take-off. The flight engineer feels the responsibility. He and his gang have declared the plane okay. He knows that the generators, for instance, are one of the biggest problems and that during take-off and initial climb, when they are overloaded—particularly when the wheels come up—one may go haywire and boil over a battery.

All goes well. A climb is made to 5,000 feet and revs settle to 2,000, with 26 inches of mercury. The wheels are up and the instruments indicate that all four engines are functioning properly. The pilot starts working on his check chart, making notations as he climbs, turns, feathers the propellers, tests the de-icer boots, calibrates airspeed, equalizes generators, and does a hundred other things—re-checking all that has been done on the ground and

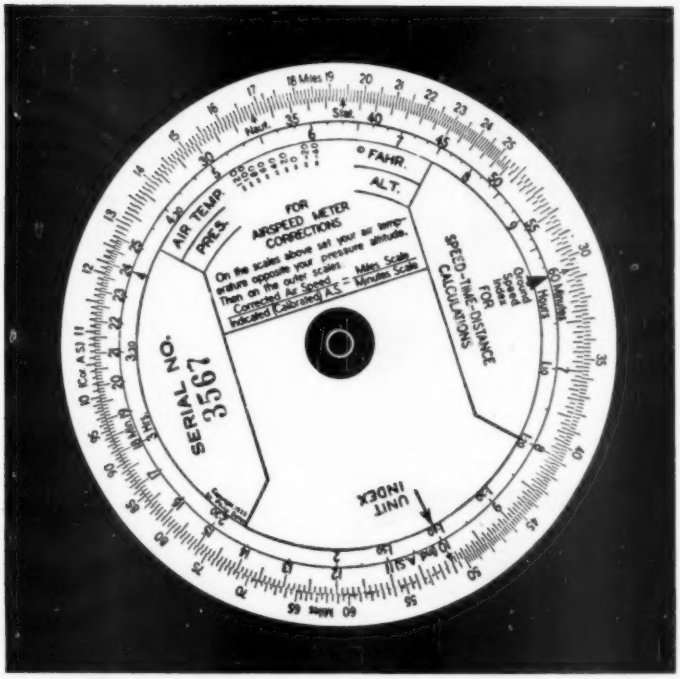
(*Continued on page* 142)

After a double check on every instrument during final engine run-ups, inspector places seal on control wheel which will be broken only when pilot takes over for test flight.

USE THAT COMPUTER!

By
RUSS BRINKLEY

Pilots need not be afraid of the simple aircraft computer. It is an easy instrument to operate. Here's how it works.



This computer is just a circular slide rule recalibrated for flying.

AT some time or other, nearly every licensed pilot and student has owned a circular slide rule. But, because these aviation computers often are not accompanied by a set of instructions, too often they remain in the flight kit as an ornament or plaything rather than realizing their potential as an important aid in flight procedure.

Airline and military pilots employ the computer continuously, on the ground and in the air, in flight planning and in carrying out their flight plans to the logging stage. Since it is used for so many calculations, the computer rarely leaves the side of the airline pilot during flight.

Before flight, the circular slide rule is employed to determine headings and to calculate speeds, horsepower requirements, desired manifold pressure, engine revolutions to develop necessary horsepower, and fuel consumption. During flight, new speeds are computed with changes of wind, time intervals and speeds to radio check points are determined and most efficient operations procedures are made possible—all with the aid of a simple slide rule whose cost is less than the most insignificant control panel instrument.

The computer makes it possible to multiply, divide and calculate some of the most intricate problems of navigation and mathematics in the shortest period of time.

At first glance the computer might seem to be a complicated instrument, and indeed it is if approached from the scientific standpoint. It is a circular slide rule whose calculations are based on logarithms. But a knowledge of logarithms is unnecessary to make it work.

For use in navigation and other aviation problems it is only necessary to know how to set up the figures on the graduated discs. In reading the answer, however, the decimal point must be added mentally, thus, for example, the operator determines whether it is .9—9—90—or 900. The instruction manuals may prove confusing but a very simple method is available and the operator may soon obtain the desired results with a small amount of problem practice.

On the slide rule side of the simplest computer will be found two graduated circular disc scales. The smaller inner scale is the time scale and the larger outer scale is the distance or, in fuel consumption problems, gallons scale. Also on the face of this scale may be two small windows through which air speed and altitude corrections may be calculated. Instructions for these types of problems are usually printed on the face of the computer. The methods for working other types of problems are usually left to the ingenuity of the operator and many computers are not used to their fullest advantage for that reason.

For the convenience of those who would learn the easy way, the author herewith lists the methods which he has used successfully in training pilots, navigators and radio men in Army, Navy, CPT and airline schools. Regardless of their previous knowledge or ability the students usually grasped this information more readily than when they were taught computer use by the logarithm route.

The pilot will be called to work approximately a dozen types of problems in pre-flight planning and during flight. The procedures employed are demonstrated here in their simplest sense. Anyone following these instructions can easily set up the figures on the dials and read the results in their proper places.

Before proceeding with the problem setups, it will be best to remember that the *figure 10 index* will be found on both inner and outer scales, but the *60 index*, better known as the *time index*, will be found on the inner scale only. Since so many answers are determined opposite these index points, the operator should understand their differences.

The first and simplest type of problem is that of division. For an example, to divide 81 by 9, merely place the smaller number on the inner scale opposite the larger number on the outer scale and look for the answer of 9 opposite the *10 index* of the inner scale (Figure 1).

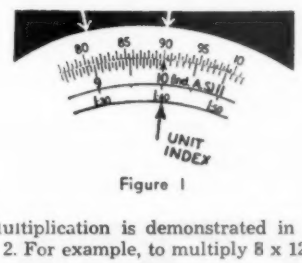


Figure 1

Multiplication is demonstrated in Figure 2. For example, to multiply 8 x 12 the

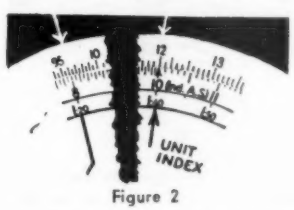


Figure 2

inner *10 index* is placed opposite the larger number 12 of the outer scale. The answer will appear opposite the smaller number 8 of the inner scale.

Now for problems of time, speed and distance. Suppose it is necessary to determine how much time will be required

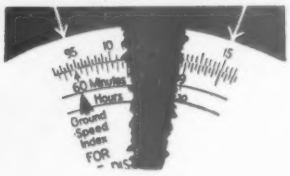


Figure 3

to make a trip of 150 miles at a ground speed of 95 m.p.h. In any problem where the speed of the airplane is known, set the inner *60 index* opposite the speed on the outer scale (Figure 3).

When it is desired to determine speed being made over a route and the time required to cover a certain distance is

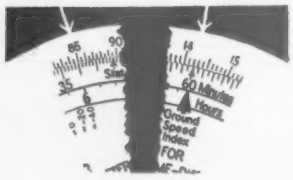


Figure 4

known, such as 85 miles in 36 minutes, set the time on the inner scale, opposite the distance on the outer scale, and read the speed on the outer scale, opposite the *60 index* of the inner scale (Figure 4).

To determine what distance can be covered in a stipulated period of time at a known speed, again set the inner *60 index* opposite the speed on the outer scale and

Figure 5

read the distance on the outer scale opposite the time on the inner scale (Figure 5) where the time is 1 hr. 5 min., and the speed 165 m.p.h.

To calculate gasoline consumption for a certain period, say 2 hrs. and 11 min., when it is known that the engine burns 21 gallons per hour, multiplication is em-

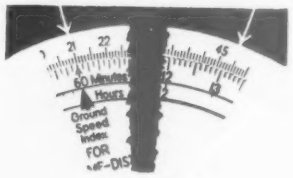


Figure 6

ployed. Set the inner *60 index* opposite the g.p.h. consumption of 21 on the outer scale. Read fuel consumption for the trip on the outer scale, opposite time on the inner scale (Figure 6).

To calculate how long a plane can fly on the fuel it is carrying when the hourly rate of consumption is known, a division problem is set up. Assume the plane is carrying 125 gallons of fuel, burning 36 gallons per hour (Figure 7). Set the inner *60 index* opposite hourly consumption on the outer scale. Then read the time plane can fly on inner scale opposite number of gallons carried on outer scale.

Figure 7

In determining the time required to descend from 8,500 feet to the ground at the rate of 500 feet per minute (Figure 8), set the descent speed on the inner scale opposite the altitude to be lost on the outer scale. Time required for the descent may be read on the outer scale, opposite the *10 index* of the inner scale.

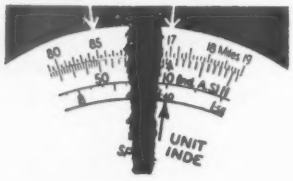


Figure 8

In correcting for off-course problems (Figure 9), where the pilot has drifted seven miles to the right of his heading after flying 95 miles, determine the number of degrees of error by setting the number of miles off heading on the outer scale, opposite miles flown on inner scale. Read degrees off heading opposite inner *60 index*.

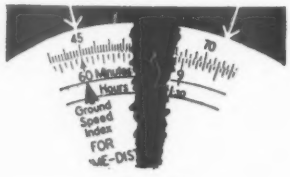


Figure 9

To determine how much fuel remains in the tanks during flight, first calculate how much has already been burned. As in Figure 10, to determine fuel already used when a plane has been flying 1 hr. 9 min., burning 24 gallons per hour, set

Figure 10

the inner *60 index* opposite hourly consumption rate and read amount already burned on outer scale opposite time in flight on inner scale. Then mentally subtract this figure from the amount of fuel carried at beginning of trip. Result is fuel remaining.

In some of the more complicated problems where revolutions per minute and horsepower are involved, the pilot must know the engine constant and the b.m.e.p. or brake mean effective pressure. With this information in mind, he can readily compute the number of engine revolutions required to develop stipulated horsepower. In Figure 11 he can determine the number of r.p.m. necessary to develop 625 h.p. with a radial engine with a b.m.e.p. of 135 and a constant of 435.

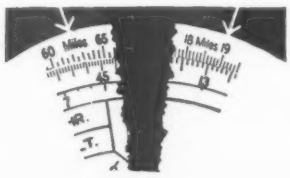


Figure 11

Set the constant on the inner scale, opposite the horsepower desired on the outer scale. Read the r.p.m. required to develop 625 h.p. on the outer scale, opposite engine b.m.e.p. on inner scale.

The last type of problem deals with converting specific fuel consumption to gallons per hour. Each engine has a different specific consumption and a certain weight of fuel is burned per hour for every horsepower developed. To convert this consumption to gallons per hour follow the setup as shown in Figure 12. Assume the engine burns .43 lb. per horsepower hour. It is desired to learn how many gallons per hour will be burned. Set the inner *60 index* opposite the horsepower being developed on the outer scale. The plane is developing 625 h.p. Read the gallons per hour consumption on the outer scale opposite the specific fuel consumption on the inner scale.

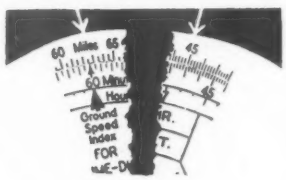


Figure 12

The obverse, or wind rose side of various computers is used to plot courses, headings, wind directions and velocity, but the slide rule side, described here, is of principal use to the pilot and navigator. The computer has been designed to facilitate the pilot's chores and those who overlook it might greatly benefit by becoming familiar with its assets. The savings in time, money, and effort will repay any flyer who learns to master it. Thousands of simple calculators now available but rarely used should be brought into play if pilots are to fly most efficiently.

END

Requiem for the WASP

Four WASP on the flight line at the Dodge City, Kans., Army Air Field. The WASP was started because of a shortage of men pilots.

By BARBARA E. POOLE

In a farewell to the disbanding WASP, an ex-member reviews the women pilots' record and finds it good.

THIS is a requiem for the WASP. Gen. H. H. Arnold, commanding general of the Army Air Forces, has just set the date of the funeral by ordering the Women's Air (Force) Service Pilots disbanded as of December 20.

A bill to militarize the WASP and give it recognized status, along with the WACS, WAVES, Army and Navy nurse corps and similar women's groups was killed in Congress several months ago by an active minority. Another bill is now before the House Military Affairs Committee proposing to put the WASP into the regular Army. But since it seems unlikely to pass, General Arnold's order undoubtedly will take effect and the WASP will be dissolved just in time for its members to get home for Christmas.

The general public and even most of those men and women interested in commercial aviation have seemed to know little about these girls who have been flying for their country for the past two years. And this is written by an ex-WASP who has no personal love for the organization as such, but who offers tribute here to the fine job it has done since its inception.

We have spent large sums to train the WASP. Now we are throwing this money away at the demand of a few thousand male pilots who were employed, until recently, in a civilian capacity on Government flight programs. The curtailment of the program has thrown these pilots out of work. And now they are to get the WASPs' jobs.

The demands of the unemployed male pilots have been a little far-fetched. "Throw the women out," they have cried —meaning "and make room for us."

They say: "The women can't be drafted, but we can and will be."

But that's the very reason the women should have stayed where they were. What our Army needs most, our generals tell us, is men to fight on the ground. This state of affairs is very sad for the pilots but after all we're running a war, not an employment bureau for disgruntled flyers.

Can you imagine several thousand men storming the gates of the various war production factories with the same loud protests? "Throw out the women and give us jobs," their parallel demands would be. "We're skilled welders, drill press operators, mechanics. Throw out the women, and give us jobs so we won't be drafted." Can you imagine?

I'll admit that a great many male pilots

are draft-exempted by age; I might also add to that "physical disability," except that I don't understand this set-up. There are evidently a number of 4F working pilots. If these men are too weak to serve in any capacity in the Army, how are they physically qualified to fly commercially?

Obviously, the older men among the pilots were experienced before the WASP started. A California senator indignantly announced this fact as if it were the crux of the whole situation, declaring that because of it there was no necessity for keeping the WASP organization active.

To be blunt, at the inception of the WAFS (later changed to WASP) at Wilmington, Del., in September, 1942, there was a shortage of pilots. Where were the over-age, experienced pilots then? They were instructing in Army civilian contract schools, or flying CPT programs (with private instruction money on the side), making a far better salary than the USAAF offered—and with far less work. Although women could easily have filled many of these jobs, had the men been willing to enlist, whenever a school did hire a woman these same male pilots set up the same type of howl they have been directing toward the WASP.

But when the women first started flying for the Ferrying Division, was there any protest from the CAA pilots? Not at all. Flying for their country in a more arduous, lower-salaried capacity didn't interest them—then.

But when the flight program was slashed, they cried because ATC entrance requirements are so high. I often hear complaints that women were taken into the training school with 35 hours while experienced male pilots must have 1,000 hours, including 200 hours in over 200-h.p. planes.

Nobody seems to remember that when the WAFS were conceived, and pilots were at a premium, the varying requirements at the different ferrying bases were much lower. At the base where I was stationed, entrance requisites changed from time to time, sometimes they were as low as 600 hours with 100 hours over 200 h.p. Where was this avalanche of pilots then?

Miss Dorothy Young, first wing commander of the WASP, talks with her successor, Miss Carol Filmore, of Oakland, Calif.

Miss Jacqueline Cochran, director of the WASP, talks with a group of women pilots at Army antiaircraft gunnery school, Camp Davis, N. C. The WASP towed targets here.

It does not seem to be generally known that the WAFS were first formed under Mrs. Nancy Love as an experimental group of 25 girls recruited to ferry for the AAF. We had to have over 500 hours, a commercial license, a 200-h.p. rating. Most of us had more than this. Our average time, in fact, was about 1,200 hours and perhaps 85 per cent of us had been flying commercially for several years.

We received no schooling (aside from Army procedure); there was to be no personal publicity; we were, flatly, hired to ferry liaison, light and medium trainers. There was no dangling offer of glory to lure us into the fold. Most of us had been earning a better salary than the $3,000 a year offered (male civilian recruits received $3,600 for exactly the same work). We joined because we wanted to contribute our ability and experience to the war effort.

The whole purpose of the Ferry Command, as I understand it, was to employ pilots unfit for combat duty and previously trained at their own expense. This system has worked successfully for the English ATA (Air Transport Auxiliary) since the beginning of the war. Women have, in all that time, been ferrying all type aircraft for the ATA with no widespread comment from their male countrymen.

However, here at home as the Ferry Command got under way, the rapid pace of our own air war rapidly overshadowed the small number of civilian pilot applicants. This unforeseen development forced the AAF command to divert a great number of young men trained for overseas duty to domestic missions. Ferrying was one of several jobs. It was to release these trained pilots for more important work that the women were given a chance to prove their worth.

At first, many officials frankly expressed opinions that we would "crack-up a dozen planes before the end of three months." At the end of one year those 25 WAFS had a record of 0.00 per cent pilot error on file with a Government Board that played no favorites.

And don't think we sat on the ground. I, personally, ferried approximately 400 hours in the first nine months. All the girls worked just as hard and were proud of the fact that Ferrying Division Headquarters at last decreed that the girls had earned the opportunity to ferry any airplane they were capable of handling.

If you don't think we proved our worth, let me purr the following anecdote: On an "L" (liaison) trip, my flight had the same destination as 12 men flying the same type airplane. My flight delivered okay. The 12 men delivered *two!* Ten little airplanes, in various stages of disintegration, lay along the way. Each little airplane cost you, and me too, somewhere in the neighborhood of $3,000 apiece. And that wasn't an isolated instance.

Whatever the reason may have been for our efficient deliveries—we were more experienced on light airplanes, we were more careful of weather, we were "eager beavers" and set a pace too outrageously hard to keep—the fact remains that we did our

(*Continued on page* 146)

Street-intersection landing demonstrates efficiency of Hiller-copter's twin rotors. Elimination of Sikorsky-type tail rotor reduces drag.

The Hiller-copter

By WILLIAM FLYNN

Staff Writer, San Francisco Chronicle

Teen-age inventor constructs helicopter with twin rotors and simplified controls.

A CO-AXIAL rotor helicopter, whose twin blades revolving in opposite directions eliminate the necessity of a tail rotor to aid control, has been added to the list of aircraft that may provide wings for personal flying.

It is the "Hiller-copter, NX-30033," the invention of Stanley Hiller, Jr., 19-year-old Berkeley and San Francisco, Calif., youth. He has been employed by Henry J. Kaiser, famed Pacific Coast builder of dams, seagoing freighters, and Fleetwing airplanes, to design and build the revolutionary type of craft. The Navy Department requested deferment of his scheduled Selective Service Act induction to permit him to continue his scientific experimental work.

The first public demonstration of the *Hiller-copter* proved that it could fly—up and down, sideways, forward, backward and chase its own tail in a tight circle, right or left. After the flight, Grover Loening, veteran airman and designer and aircraft consultant for the War Production Board, described the craft as a "remarkable achievement," and Hiller as "a very talented young man."

Hiller became interested in helicopters three years ago when he saw pictures of the Sikorsky helicopter in flight. Study and investigation convinced him he wanted something more than the conventional helicopters could provide. He decided to design one himself.

"The earlier helicopters were unwieldy and complicated and took too long to learn to fly," he explains.

Son of Stanley Hiller, Sr., San Francisco shipping executive who flew planes of his own design before World War I, young Hiller began his helicopter experiments with a fund of experience in the field of construction and design.

He began tinkering with tools when he was five years old. When he was 10 he constructed a toy automobile that carried him about the streets of Berkeley. Two years later he had invented a model auto racer that could turn out 107 m.p.h. when guided by a cable around a circular course.

The miniature racer, 19 inches long, was developed into a $100,000 a year business because he decided that $200 was too much to pay for one. He began to build them on a mass production basis in a "backyard factory" and his list price eventually was $28.

"He is just following in his father's footsteps," Mrs. Hiller says, "for Stanley Senior is very mechanic-minded."

The father holds approximately 100 patents on machine inventions. He operates an aluminum die casting plant turning out aircraft parts with procedures and formulas that young Hiller worked out and invented.

(*Continued on page* 158)

Stanley Hiller, Jr., 19-year-old inventor, seated in his co-axial rotor helicopter. New mechanism eliminates tail rotor.

FRONT LINE AIRSTRIPS

By KENNETH R. PORTER

FLYING's European War Correspondent

Thunderbolt takes off from partially completed airstrip almost within sight of the enemy. Strip construction took only a few hours.

Fighting Engineers of the Ninth Air Force build full-size airports in the enemy's own front yard.

SOMEWHERE IN FRANCE

THE emergency landing strip from which I write was the first one completed in France. Personnel of the Ninth Air Force Engineers clambered out of their assault boats on D-plus-1 (the day after invasion) to find German 88's and mortars all over the area. The advance detachment of the Engineer Aviation Battalion—28 men with two bulldozers, two motorized graders, and one 2½-ton dump truck—started work on this particular field under shell fire and well within range of Jerry snipers.

They had an emergency strip ready within a few hours, but their work continued until the runways were extended to 3,600 feet and the strip was fitted with suitable marshalling areas and taxiways. The whole job was completed in slightly more than two days, maybe that's why it's still called an emergency landing strip. Actually it is a transport field where Douglas *Skytrains* pick up the wounded for air evacuation. Since D-plus-3 thousands of wounded have left from this very spot and the field now serves as an airport for incoming supplies and personnel as well.

Much of the secrecy surrounding the existence of the Engineer Aviation Command of the Ninth Air Force has recently been lifted and methods of selecting and constructing the numerous emergency landing strips they have built in France can now, in a measure, be disclosed.

The Ninth Engineer Command, headed by Brig. Gen. James B. Newman, Jr., is composed of aviation engineers trained and armed for combat construction of advance airdromes on the continent. General Newman had a record of 26 years of service with the corps of engineers at the time he was assigned to this new group. It was the first separate aviation engineer command to be activated within an air force, although aviation engineers were recognized by the War Department as early as June, 1940. The Ninth Air Force group was formed November 24, 1943.

Original units were split and resplit to form *cadres* for all the separate battalions. Aviation engineers now form the ground spearhead for pushing ahead Ninth Air Force fields as the land armies advance.

They are armed with a variety of weapons including bazookas, antitank and antiaircraft guns, grenade launchers, armed half-tracks, antitank mines and a full complement of small arms. Equipment operators, welders and machinists,

(*Continued on page* 114)

"Tar-papering" the surface of a new airstrip with Hessian, asphalt-impregnated burlap strips.

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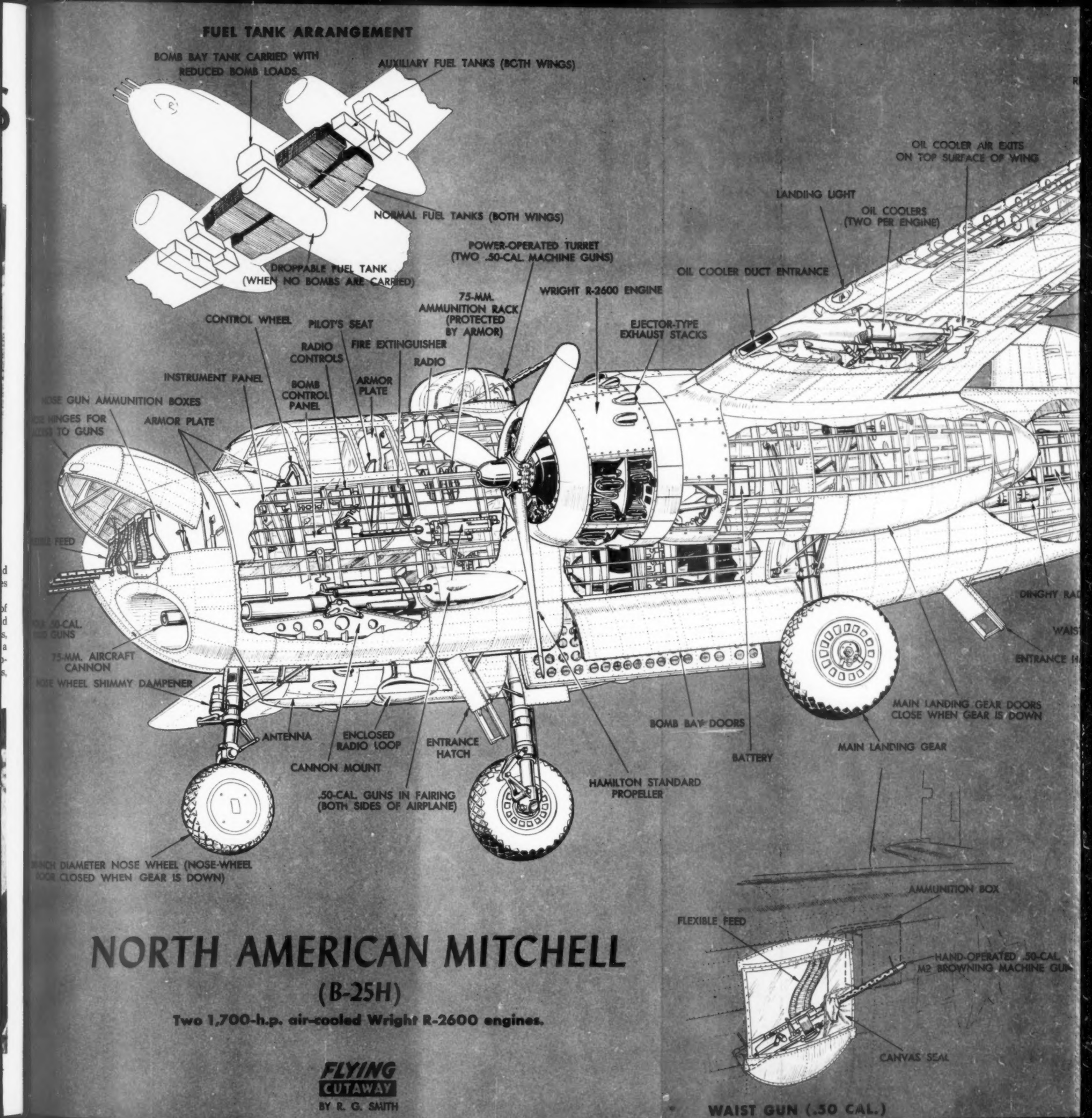


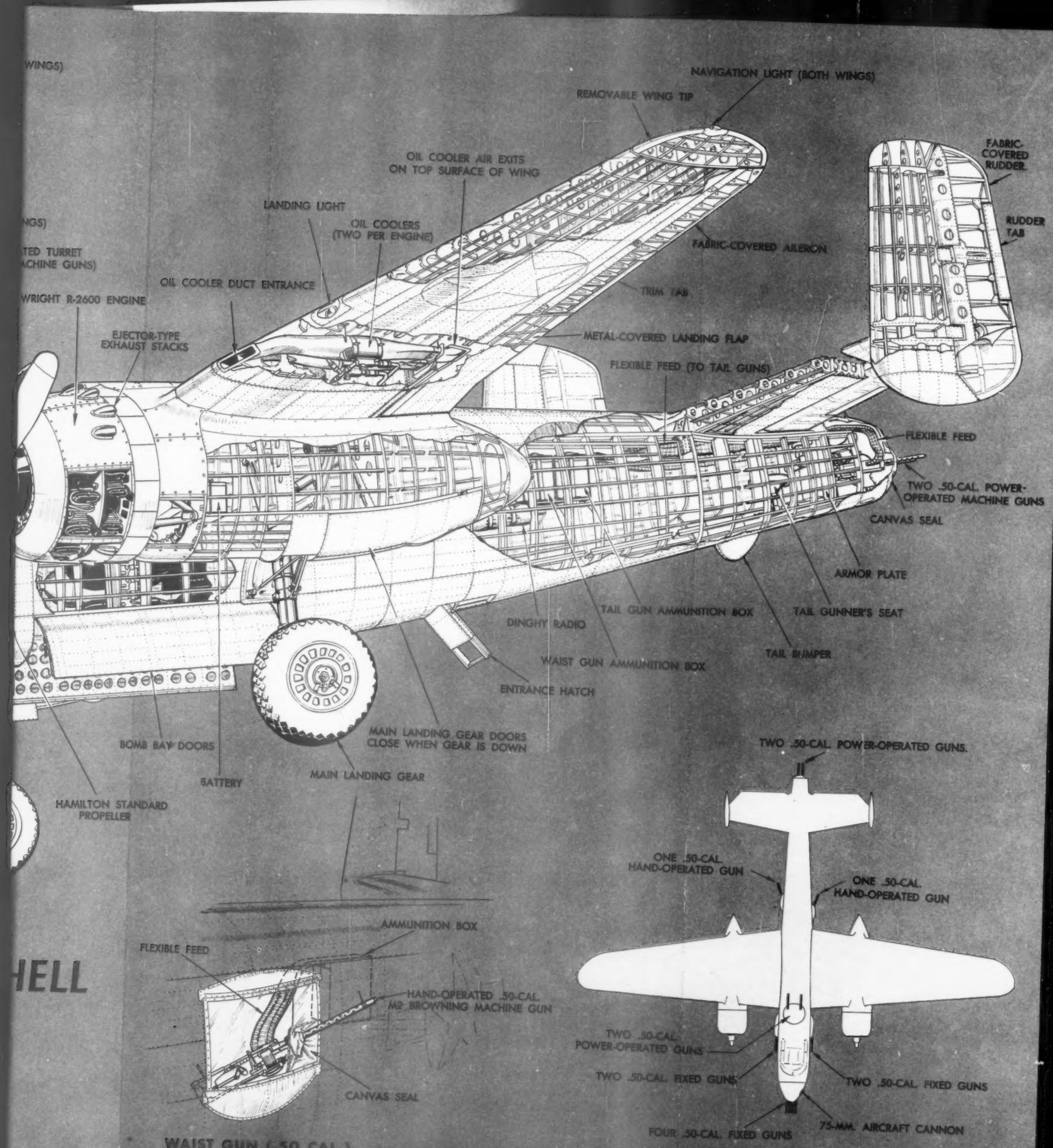
NORTH AMERICAN MITCHELL

(B-25H)

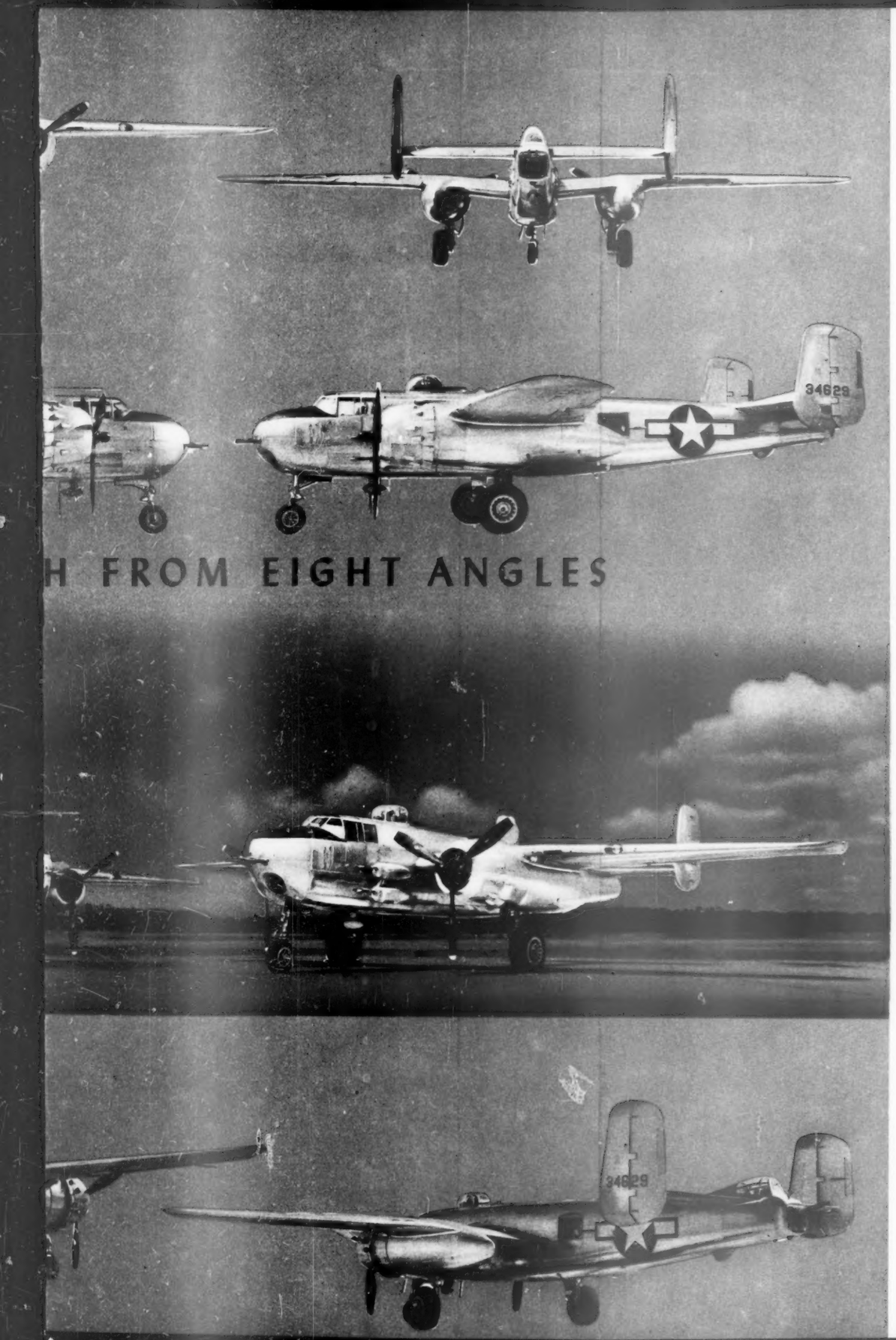
Two 1,700-h.p. air-cooled Wright R-2600 engines.

FLYING CUTAWAY

BY R. G. SMITH


WINGS)
NAVIGATION LIGHT (BOTH WINGS)
REMOVABLE WING TIP
OIL COOLER AIR EXITS ON TOP SURFACE OF WING
FABRIC-COVERED RUDDER
RUDDER TAB
LANDING LIGHT
OIL COOLERS (TWO PER ENGINE)
FABRIC-COVERED AILERON
TED TURRET
ACHINE GUNS)
OIL COOLER DUCT ENTRANCE
TRIM TAB
WRIGHT R-2600 ENGINE
EJECTOR-TYPE EXHAUST STACKS
METAL-COVERED LANDING FLAP
FLEXIBLE FEED (TO TAIL GUNS)
FLEXIBLE FEED
TWO .50-CAL. POWER-OPERATED MACHINE GUNS
CANVAS SEAL
ARMOR PLATE
TAIL GUN AMMUNITION BOX
TAIL GUNNER'S SEAT
DINGHY RADIO
TAIL BUMPER
WAIST GUN AMMUNITION BOX
ENTRANCE HATCH
MAIN LANDING GEAR DOORS CLOSE WHEN GEAR IS DOWN
BOMB BAY DOORS
BATTERY
MAIN LANDING GEAR
HAMILTON STANDARD PROPELLER
TWO .50-CAL. POWER-OPERATED GUNS.
ONE .50-CAL. HAND-OPERATED GUN
ONE .50-CAL. HAND-OPERATED GUN
AMMUNITION BOX
FLEXIBLE FEED
HAND-OPERATED .50-CAL. M2 BROWNING MACHINE GUN
TWO .50-CAL. POWER-OPERATED GUNS
TWO .50-CAL. FIXED GUNS
TWO .50-CAL. FIXED GUNS
CANVAS SEAL
FOUR .50-CAL. FIXED GUNS
75-MM. AIRCRAFT CANNON
WAIST GUN (.50 CAL.)

34629
THE B-25H FROM EIGHT ANGLES
34629

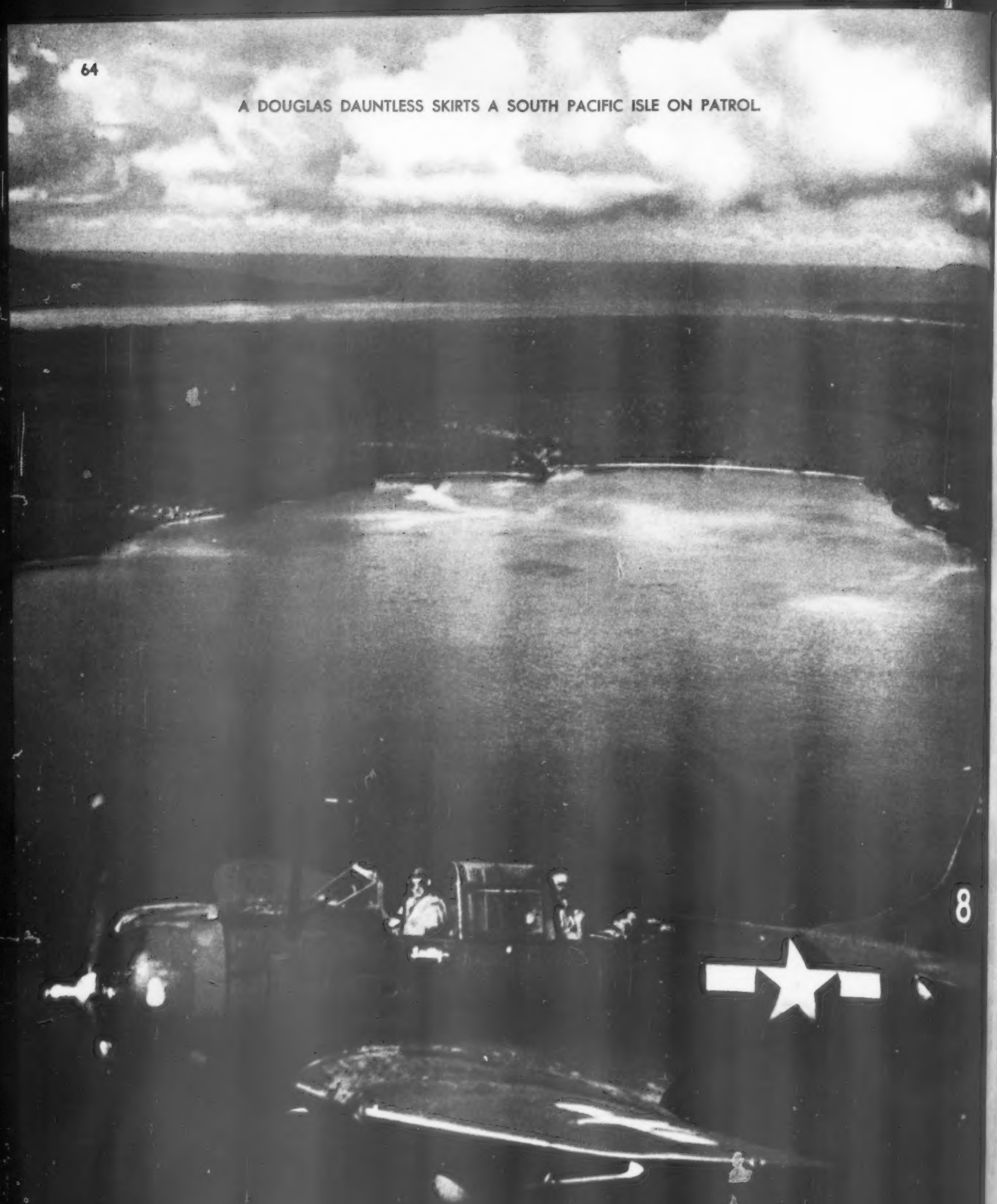


NO other present-day military airplane can concentrate as much firepower on a given target as can this version of the North American *Mitchell*. While not the latest *Mitchell* (a newer model has more machine guns but no cannon), the B-25H undoubtedly is the deadliest. While the "H" has yet to be reported in the invasion of Germany, it has done a devastating job against the Japs in the Pacific. Its 75-mm. cannon and 14 .50-cal. machine guns have pulverized Jap shipping and shore installations; one hit from the 75-mm. gun can sink a small warship or wipe out a building. Its machine guns alone can sink ships. Head-on, the B-25H is two machine guns and one cannon deadlier than the *Thunderbolt*. Following are B-25H specifications:

Wing span: 67 ft. 6 7/10 in.	Length: 51 ft. 3¾ in.
Height: 16 ft. 4 3/16 in.	Wing loading 44 lbs. sq. ft.
Gross weight: 32,300 lbs.	Empty weight: 19,924 lbs.
Top speed: 300 m.p.h.	Cruising speed: 239 m.p.h.
Stalling speed: 95 m.p.h.	Service ceiling; 25,000 ft.

LOADING MACHINE GUNS AND CANNON OF A MITCHELL (B-25H).

A DOUGLAS DAUNTLESS SKIRTS A SOUTH PACIFIC ISLE ON PATROL.



MORE PLANE FOR YOUR MONEY

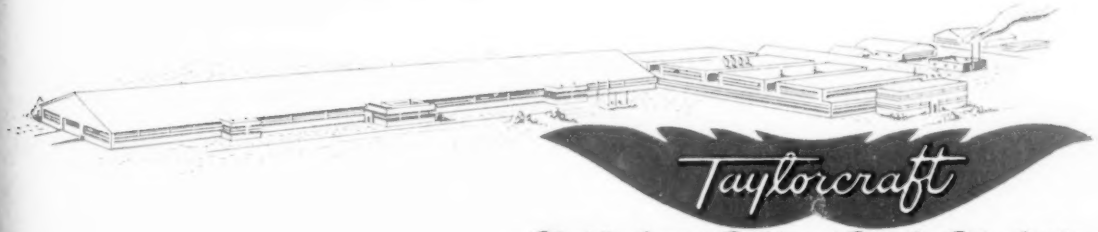
BY "MORE PLANE" we don't necessarily mean a bigger or heavier plane for less money. We mean finer performance, greater stability and longer cruising range—more genuine owner satisfaction.

But don't take our word for it! Ask any Taylorcraft owner at your local airfield—he'll tell you how it can outfly and outclimb any plane in its class.

And he'll give you scores of other reasons that will substantiate our statement—Taylorcraft—more for your money.

The new Taylorcrafts will be well worthy of the reputation established by earlier models. Valuable experience gained through the building and designing of Army and Navy light planes in large volume, and the availability of newly developed materials will contribute greatly to the performance of your postwar Taylorcraft.

Our aim is to deliver to a peacetime America, in the future as in the past—more flying for your money.



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World's Largest Builders of Side-by-Side Airplanes

TAYLORCRAFT AVIATION CORPORATION · ALLIANCE, OHIO

VULTEE VIGILANT (FORMERLY STINSON O-49) ARMY LIAISON PLANE.

The thing to do TODAY...

END THE WAR ONE DAY SOONER! Would one day make much difference? Well, World War I ended November 11, 1918 . . . and on November 10, *26,000 men were killed!* The casualty list will probably be high this time. So ending the war even one day sooner will forestall tragic thousands of those messages beginning "The War Department regrets . . ."—one of which might come to your house.

Join the Women's Army Corps. There are 239 different kinds of work to be done . . . and *you* can do at least *one* of them *well.*

to bring TOMORROW SOONER

TOMORROW! WHAT A PROMISE! Never before has "Tomorrow" meant so much. Peace, home, work, fun . . . and a host of things to make life richer and fuller. Greater travel by air, for one. And private planes to serve you daily as your automobile never could.

Your new Cessna will take you at least 500 miles in a morning, 1,000 in a day. Distant recreation spots, shopping centers, friends . . . they'll be at your finger tips. And you will have your pick of fishing streams, golf courses, sports events . . . plus the tremendous business advantage your Cessna will give you. Moreover, you'll find air parks (landing strips, as in the picture) for your use . . . most wide-awake communities already have plans for them well under way.

Your new Cessna will be *"Cessna-Engineered for Safety."* Building that new Cessna will necessitate a period for reconverting our plant, now devoted to war work, but we'll begin production as soon as possible. Then, your Cessna will be a worthy successor to the famous Cessna Airmaster, three times judged the "World's Most Efficient Airplane."

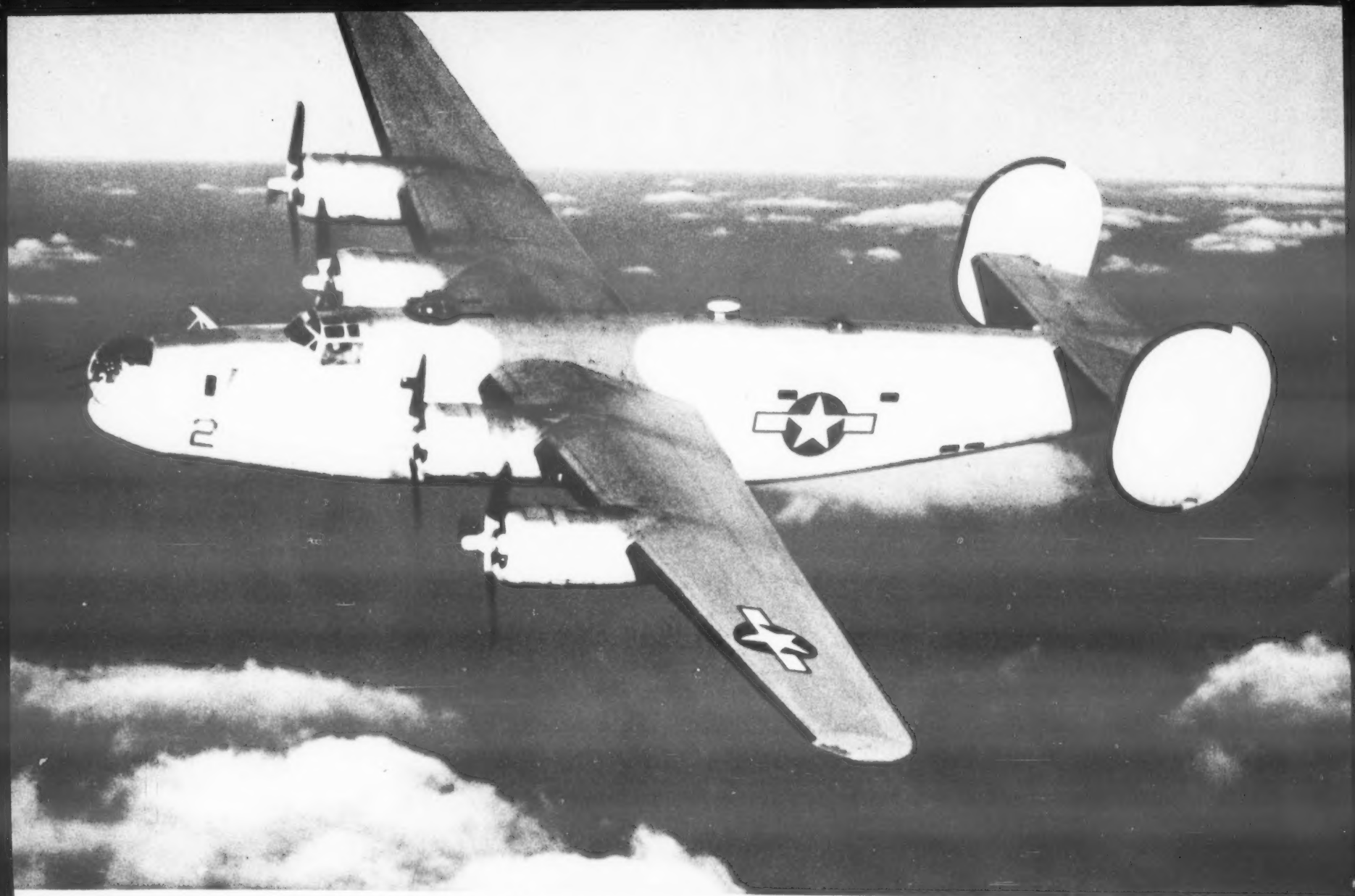
Priority Delivery By Buying War Bonds Now . . .

Be one of the first to own a Cessna after the war. Orders are certain to exceed production, but you can get a preferred listing for early postwar delivery. Costs you nothing. No obligation to buy. Write today for the simple Priority Plan. *Remember to buy War Bonds and keep them to pay for your Cessna.* CESSNA AIRCRAFT COMPANY, Box 1616-F, Wichita, Kansas.

Cessna

ARMY (E) ★★ NAVY

SYMBOL OF AIRCRAFTSMANSHIP FOR THIRTY-THREE YEARS



STANDARD NAVY SEARCH PLANE IS CONSOLIDATED LIBERATOR. LATER VERSION (PB4Y-2) HAS SINGLE RUDDER.

STANDARD NAVY SEARCH PLANE IS CONSOLIDATED LIBERATOR. LATER VERSION (PB4Y-2) HAS SINGLE RUDDER.

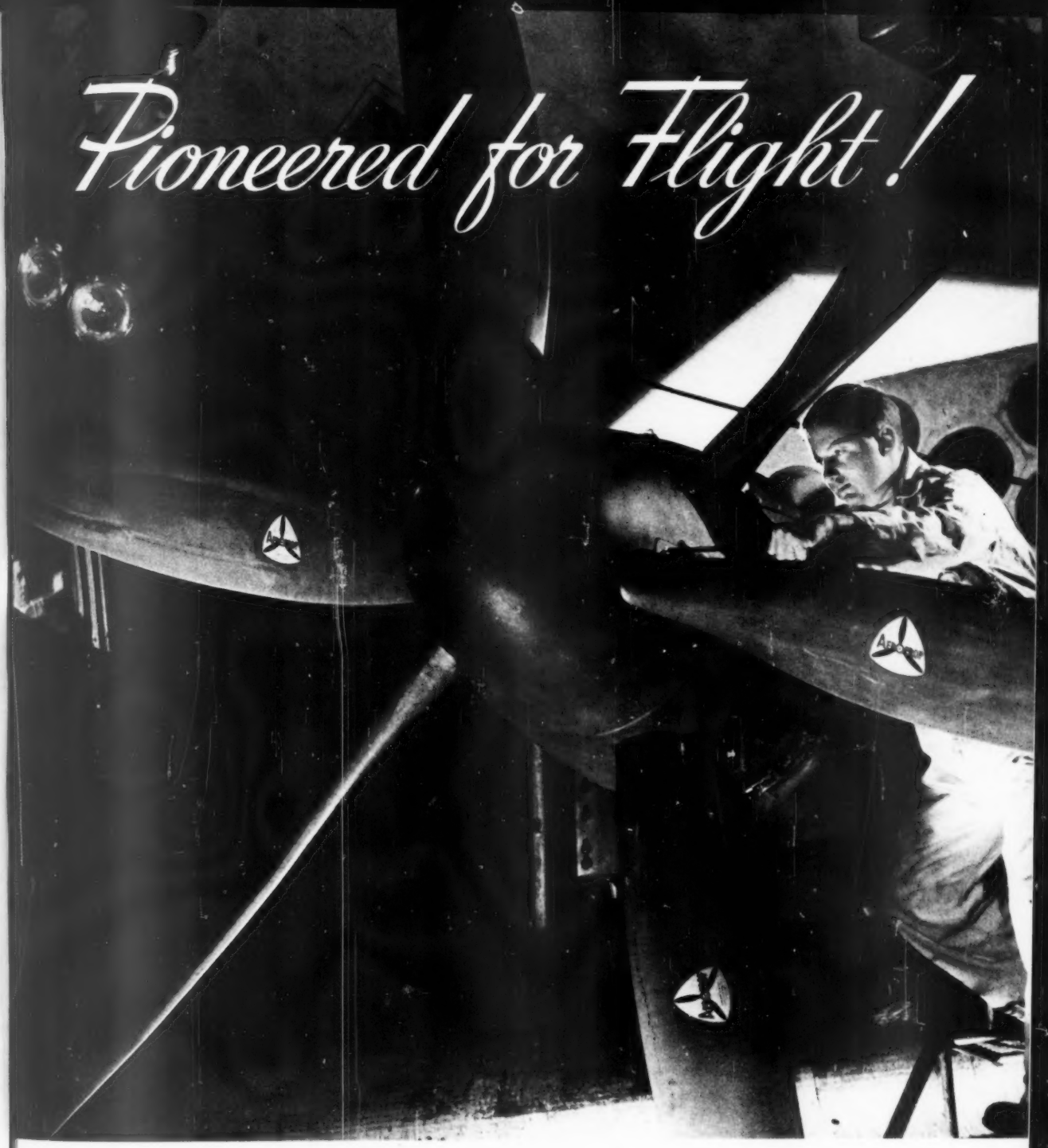
Precision in name . . . precision in performance . . . Hughes Ball Bearings, Hughes Flexible Feed Chutes and Hughes Ammunition Boosters are all contributing their part in exacting efficiency to the brilliant achievements of our fastest fighters, and the responsibility for their perfection is a trust we accept with pride. Mastery of mass-production requiring such skill serves well as a pattern for the peace to come.

PRECISION

Armament Division
HUGHES
HUGHES AIRCRAFT CO.
A UNIT OF HUGHES TOOL COMPANY
HOLLYWOOD 38 CALIFORNIA
U. S. A.

HIGH-PRIORITY CARGO GOES ABOARD AN AIR TRANSPORT COMMAND SKYTRAIN.

Pioneered for Flight!



HIGH-PRIORITY CARGO GOES ABOARD AN AIR TRANSPORT COMMAND SKYTRAIN.

THIS GIANT six-blade Aeroprop was developed for specific military use. It is the only dual-rotation propeller now in production for American fighting planes. Despite the unique problems encountered in combining two sets of contra-rotating blades, this propeller embodies the same simplicity, lightness, and strength that are the basic engineering principles of all Aeroprops. Years ahead in design it offers new horizons for the builders of peace-time planes.

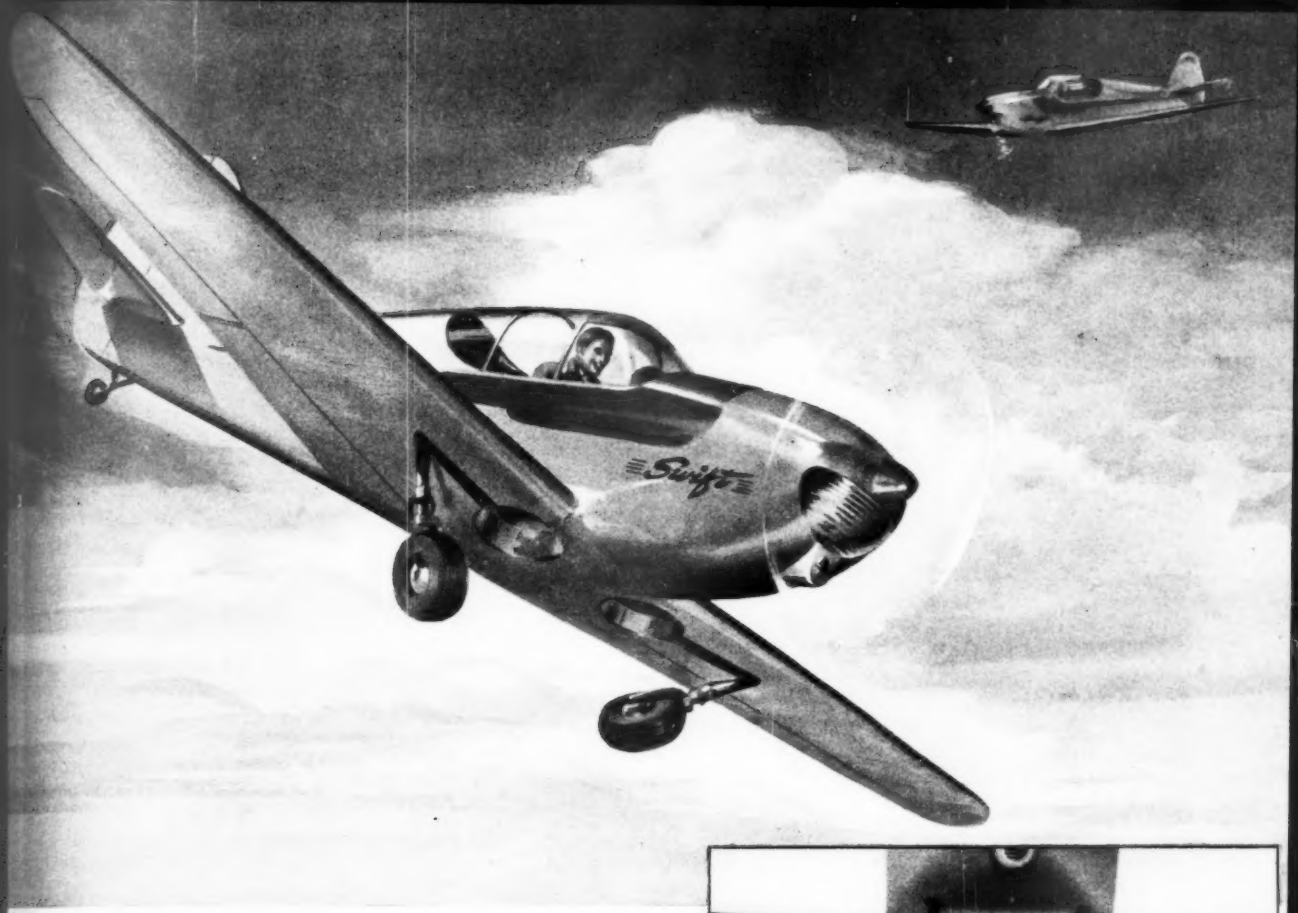
Let's Finish the Fight! BUY BONDS!

Aeroprop

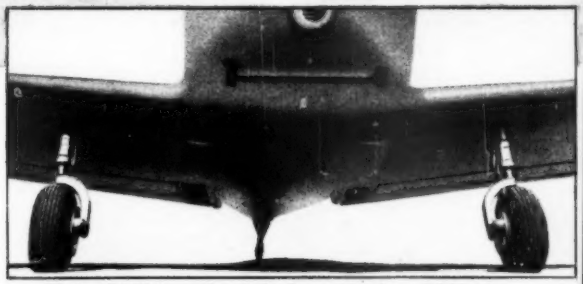
In War and Peace, Propeller Production at its Best!

AERO PRODUCTS DIVISION — GENERAL MOTORS CORPORATION • DAYTON, OHIO

CATALINA AMPHIBIANS (PBY-5A's) TIED DOWN AT THEIR ALEUTIAN BASE.



Hydraulic Retractable Landing Gear ..... with 3 Safety Features



Wide (7′ 2″) tread and the large wheels and 6.00 x 6 tires give exceptional ground stability. The new Goodyear hydraulic brakes are designed for quick, low cost servicing without removing wheels.

Choose the economical ***New Swift*** for your personal plane and enjoy the advantage of big-plane features . . . one of which is hydraulic retractable landing gear, sturdily built and designed with ***three*** safety features: (1) red and green lights on instrument panel indicating position of each wheel, (2) auxiliary manual mechanism for lowering wheels, (3) spring loaded pins that automatically lock wheels in down position.

Struts are hydraulic with steel cushioning springs . . . and long enough and at sufficient angle to throw the wheels well forward with weight on the sturdy tail wheel . . . giving extra stability in landing on rough ground or when brakes are applied quickly. Standard size 6.00 x 6 airplane tires help make landings safe and comfortable . . . and the extra sturdy shock-strut tail wheel, a special ***Swift*** feature, makes smooth landings easier and helps the ***Swift*** taxi smoothly.

You'll be be proud of your ***Swift*** and you won't be satisfied with a plane that offers you less than the ***Swift's*** many advantages. The ***Swift*** will be ready soon after conditions permit the manufacture of personal airplanes.

The Swift

ade by GLOBE AIRCRAFT CORPORATION Fort Worth, Texas

Free Booklet . . . Mail the coupon today for free illustrated booklet describing the New Swift, no obligation.

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This big black battlecruiser is the
first true night fighter

NORTHROP BLACK WIDOW
P-61 NIGHT FIGHTER

You're looking at the largest fighter plane ever built. It packs not just a pilot but *three* fighting specialists.

It is specially equipped to hunt down enemy planes in the dark. And it's "loaded for bear" with a battery of cannon and machine guns which can destroy anything that flies.

The big Black Widow has pursuit ship speed and climb. Yet it is a sweetheart to handle. It can fly securely on only one of its over-2000 h.p. motors. It is specially designed against stalling in the tightest turns —still more insurance for our fliers. And for extra safety on small, dark fields, the Black Widow is built to take off quickly, land very slowly.

That's a lot of performance for a plane as big as a heavy standard transport. But outstanding aircraft design and production is Northrop's trade. As the Northrop group produces the revolutionary P-61 today, Northrop is pioneering still more advanced airplanes for tomorrow.

NORTHROP *Designers and Builders of the* ***BLACK WIDOW P-61 Night Fighter***

NORTHROP AIRCRAFT, INC. • NORTHROP FIELD, HAWTHORNE, CALIFORNIA
MEMBER AIRCRAFT WAR PRODUCTION COUNCIL, INC.

WANT A WARPLANE?

Aeroncas, Taylorcrafts, Ryans, and Interstates at Ford-Lansing port where 30 surplus warplanes recently sold in almost as many days.

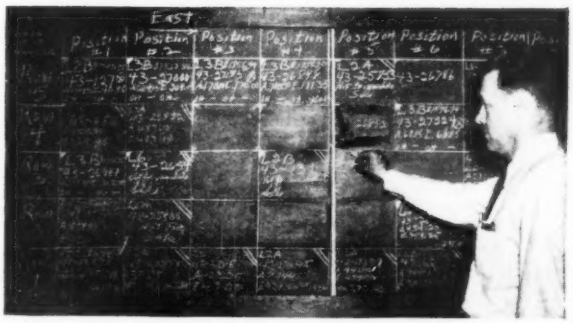
You can buy them, and you can fly them—home! Then comes the job of re-licensing.

MORE than 12 000 second-hand aircraft now are on sale at 20-odd sales bases throughout the United States. They are listed as "used service equipment" surplus to needs of the Army and Navy and of the CAA War Training Service. At the time of this report, their size range was from single-place liaison type planes to the twin-engined Cessna *Brass Hat* (UC-78). Sales management, temporarily handled by CAA personnel, is a function of the Defense Plant Corporation, the legal owner.

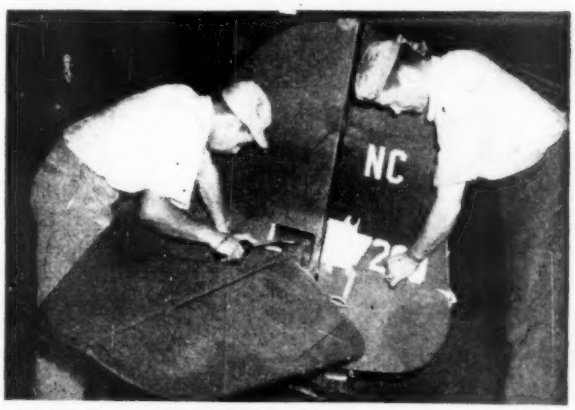
Typical of what one finds at the sales bases is the setup at Ford-Lansing airport, Lansing, Ill. Each of the half-hundred planes currently based at the field have been appraised and assigned an OPA ceiling price. Size and prices of its planes vary from a $375 Aeronca *Grasshopper* (L-3B) to a $6,736 Stinson *Reliant* (UC-81K). Ceiling prices are determined by original list price of the plane, less eight per cent deduction per year for depreciation and other deductions based on regularly scheduled overhaul requirements to date of purchase. There is no deduction based on logged hours which, for the Ford-Lansing planes, vary from 77 hours to over 2,100. Other slight variations in the final OPA figure may result, however, from the addition or removal of certain extra equipment.

Anyone may purchase outright any aircraft at the ceiling price for a period of 10 days after it is posted for sale. Planes are sold "where is" and "as is"—no flight testing is permitted, though the purchaser may have planes inspected at his own expense. If a plane has not been purchased at the end of the 10-day period, any sealed bids accepted in the meantime are opened and the plane goes to the highest bidder—subject, of course, to Government acceptance of the bid.

The purchaser is given an NC number for his aircraft and a ferry permit to his home base—then he is on his own. Before the aircraft may be flown again, weight and balance must be checked, repairs and modifications made, CAA license obtained.

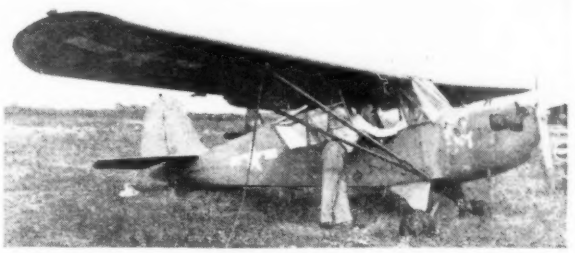


Ford-Lansing chart shows sales-yard location and gives pertinent facts concerning each aircraft. Blank spaces denote recent sales.



Airport employees inscribe NC number on newly purchased Taylorcraft. After ferrying to home base, owner must obtain CAA license.

Oldest plane on the Ford-Lansing sales lot, this Ryan PT-22 has 2,103 logged hours. The OPA has set its ceiling price at $6,189.



Youngest plane, an Aeronca L-3B, has logged 77 hours—ceiling price is $1,783. Potential buyers may inspect but cannot fly planes.

FOR IDENTIFICATION

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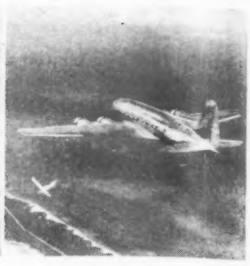

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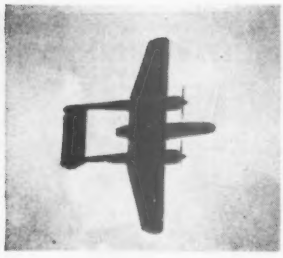

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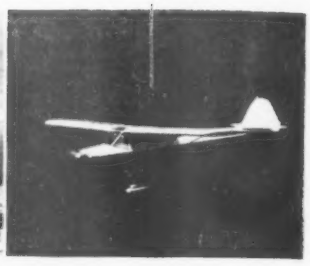

8

The planes are: 1. Stinson Reliant; 2. Curtiss Helldiver; 3. Boeing Superfortress; 4. Boeing Stratoliner; 5. Northrop Black Widow; 6. Vought Corsair; 7. Martin Mars; 8. Fairchild B-12.

MISTAKEN IDENTITIES

NOW that the Northrop *Black Widow* has gone into combat in the European and Asiatic theaters, particular study should be made of the difference between it, the Lockheed *Lightning* and the German Focke-Wulf Fw-189. They are shown below, to scale.

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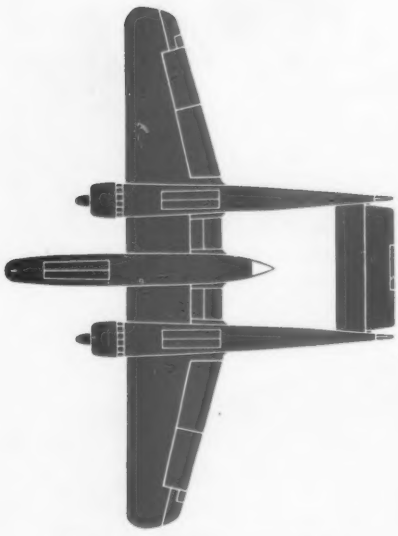
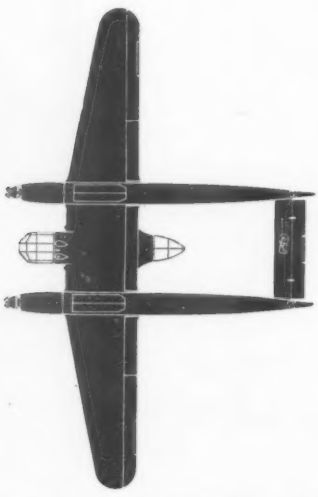
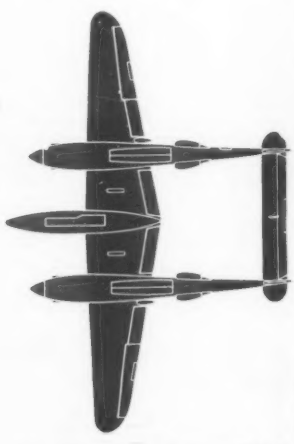


Northrop Black Widow, span: 66 feet.



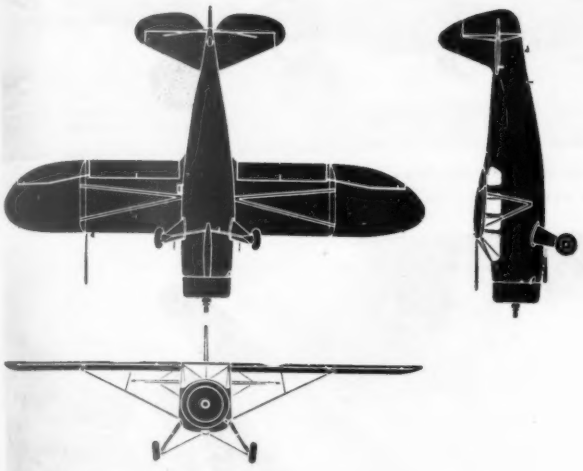
Focke-Wulf Fw-189, span: 60 ft. 4 in.

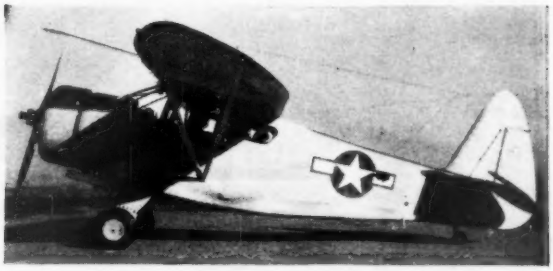


Lockheed Lightning, span: 52 feet.

HOWARD NIGHTINGALE

Ambulance-Transport





PERTINENT FACTS: Officially designated GH-2 in the Navy and UC-70 in the Army, the *Nightingale* is the military version of Howard's pre-war sport plane, the DGA-15. It is powered with a single 450-h.p. air-cooled *Wasp Junior* engine, which gives it a top speed of 175 m.p.h. at 6,100 feet. Range fully loaded is 875 miles; service ceiling is 20,000 feet. Wing span is 38 feet, length, 26 feet; height, 8 ft. 4 in.; wing area, 210 sq. ft. A five-place airplane, the *Nightingale* weighs 3,050 pounds empty, 4,500 pounds loaded. A number of specially equipped *Nightingales* also are used by the Navy as instrument flight trainers.

WHAT TO LOOK FOR: This is a high-wing, externally braced monoplane, with no taper and rounded tips. The fuselage is deep and stubby. In the underneath view, the *Nightingale* might be mistaken for a cabin Waco. The rudder and fin are triangular in shape. The landing gear is fixed.

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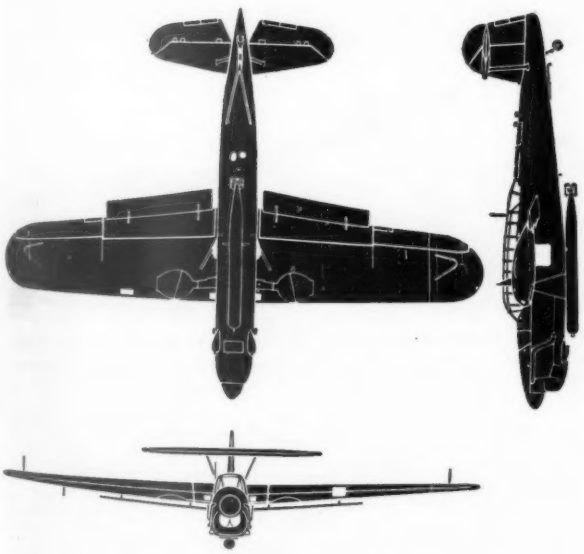
FAIREY BARRACUDA

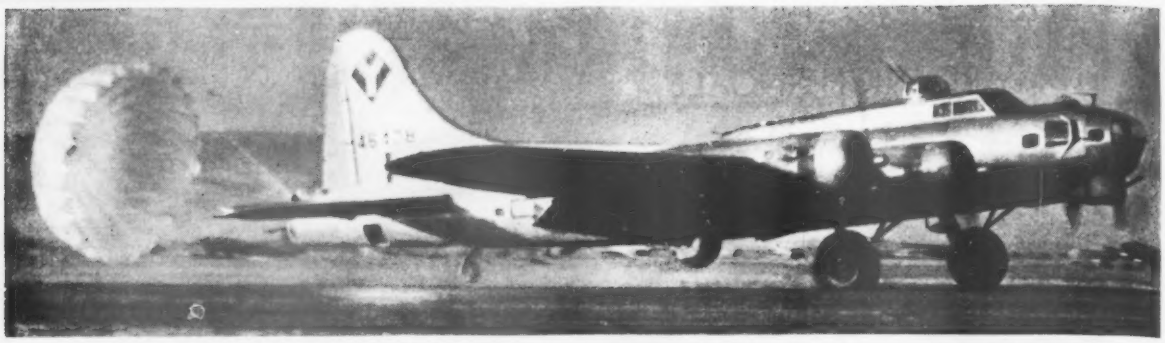
Torpedo Bomber



PERTINENT FACTS: Britain's current "home-built" torpedo bomber, the *Barracuda* originally was designed in 1939 but only recently went into active service. Powered with a 1,260 h.p. *Merlin 32* engine, the *Barracuda* carries a crew of three. Performance figures are not available. Span, 49 ft. 2 in.; length, 40 ft. 6 in.; height, 15 ft. 5 in. A single torpedo is carried externally. Additional photographs were published in FLYING, July, 1944, page 46.

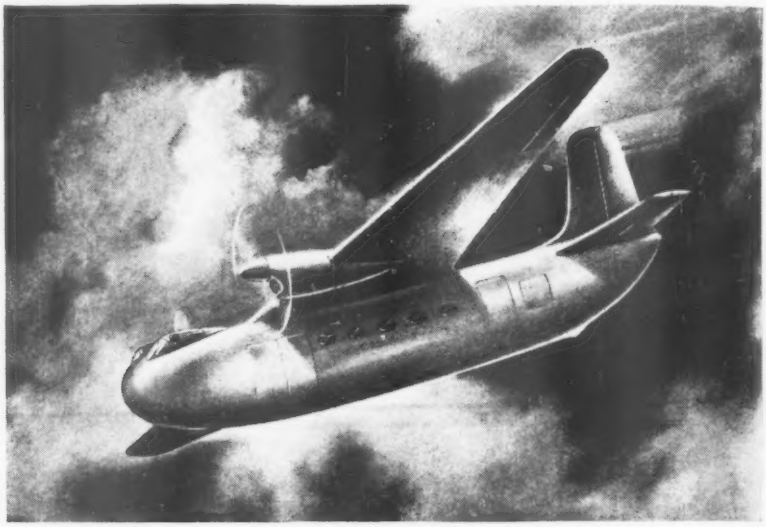
WHAT TO LOOK FOR: A high mid-wing monoplane, the *Barracuda's* wing closely resembles that of the Fairey *Fulmar*, having trailing edge taper and rounded tips. The large external flap can be seen from nearly all angles. The fuselage also resembles that of the *Fulmar*, but has two large bulging windows directly beneath the wing, probably for photographic work. The elevator and horizontal fin sit high on the vertical fin.

Copyright, FLYING, December, 1944.



Its brakes, electrical system and instruments shot out by flak over Germany, this Fortress (B-17G) was photographed as it landed in England on one flat tire. A parachute was unfurled from the rear gun turret to help slow down the plane after it had landed.

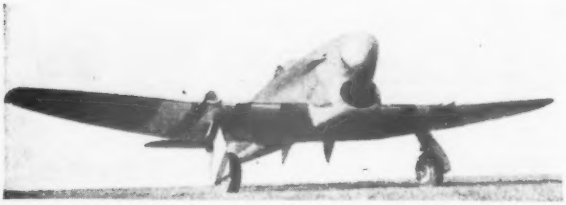
HAVE YOU SEEN ?



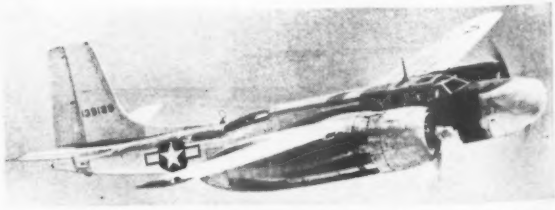
Douglas Skybus is a post-war feeder plane study, probably will not be built. Design called for two 700 h.p. engines, 24 passengers, range of 600 miles, cruising speed of 190 m.p.h.

Seafire III is new British carrier fighter, has 1,470 h.p. Merlin. Span is 36 ft. 8 in.

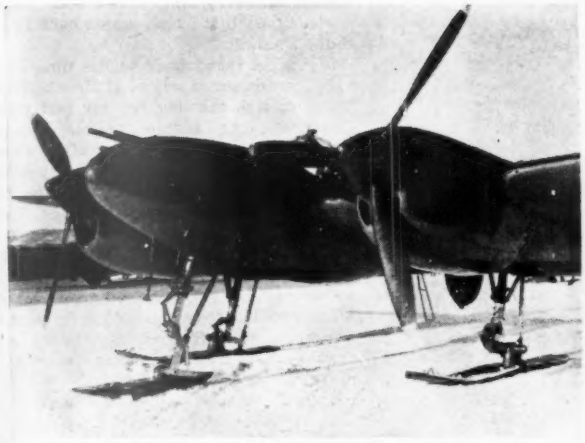
This is one of several Douglas Dauntlesses operated by the Mexican air force. Mexican pilots got dive-bombing training at U. S. Naval Air Station, San Diego, then flew Dauntlesses home.



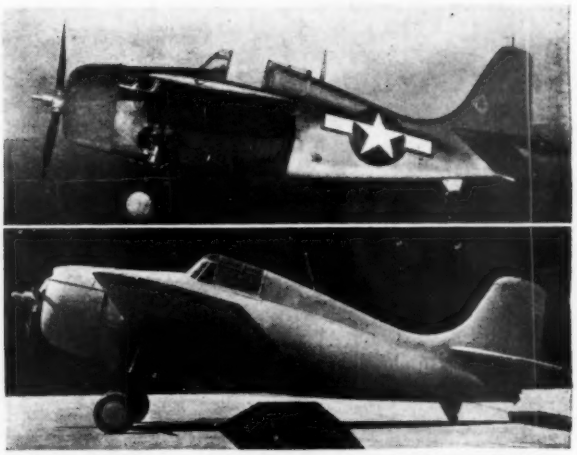
Hawker Tempest is latest RAF fighter, closely resembles Typhoon. It has 2,200 h.p. engine, four 20-mm. cannon. Wing span: 41 feet.



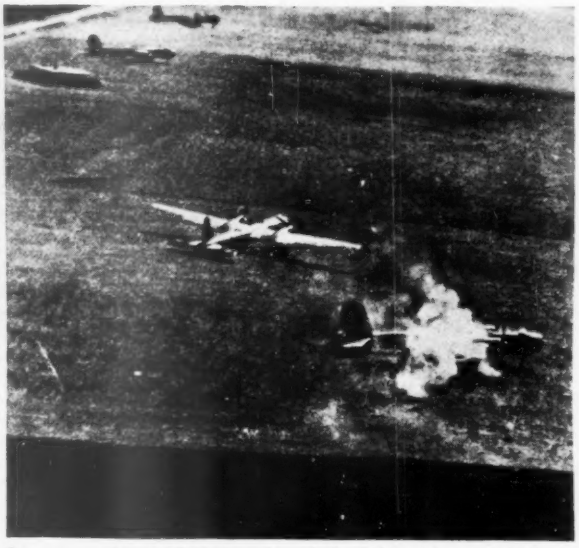
This is the first photograph released of the Douglas Invader (A-26). Censors have deleted armament. Note its likeness to smaller Havoc.



This is ski installation for Lightnings operating in the Far North. The tricycle ski gear retracts, fitting flush against the underside of fuselage and engine nacelles. This P-38J is at Ladd Field, Alaska.

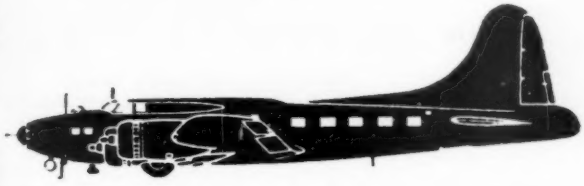


External differences between latest General Motors Wildcat (FM-2, top photo) and original Grumman F4F are shown here. FM-2 has redesigned tail, modified cowl, antenna, and cockpit.

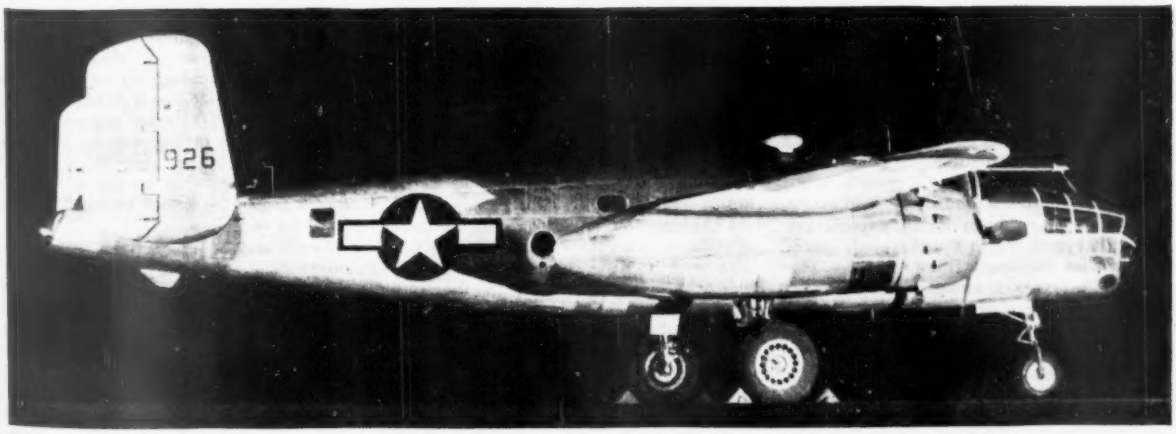


Gun camera of an AAF Mustang brought back this evidence of strafing of a German airfield. Plane exploding in foreground is one of four Heinkel He-177 bombers in the picture. He-177 is largest German bomber, has two 2,460 h.p. twin-engine power units. Wing span is 103 ft. 5 in.

Hockaday Comet is a new lightplane, has 130 h.p. Franklin. Top speed is 150, cruising, 135. Ceiling, 19,000 feet, range 500 miles. Useful load 647 pounds, span 33 feet. Price: "about $3,000."



AAF Flying Fortresses forced down in Sweden have been converted to airliners. "Aeroplane" drawing shows external changes. Plane carries 14 passengers and crew of three; will operate to Scotland and Moscow. New nose has been extended three feet.



Latest modification of the North American Mitchell is this photo reconnaissance plane, known as the F-10. It is a B-25J minus guns, with numerous special openings for the wide variety of cameras to be carried. Nose appears to be fitted with a tri-metrogon camera.

Maj. Robert L. Van Ausdall with Captain Yao (left), commander of the Chinese squadron, and Capt. Hsiang (right), vice squadron commander of Major Van Ausdall's composite fighter group.

I Learned About Flying From That! — No. 62

By Maj. ROBERT L. VAN AUSDALL

Commander, 26th Fighter Squadron, 5th Fighter Group, Chinese-American Composite Wing, 14th Air Force, China-Burma-India.

Recollections of a flight-school blunder gave this squadron commander the clue that led his fighter group safely through a weather front in the China-Burma-India theater.

SOMEWHERE IN CHINA

HERE'S the story of a little incident that occurred away back in my flight-school days—an experience that has meant much to me ever since. At present I am the American squadron commander of a Chinese-American Composite Wing (CACW) fighter squadron. Needless to say there have been many experiences here that have tested the thoroughness of my earlier training. But here's the case in point—I pass it along because it contains a fair object lesson for many young American flyers.

The other day, as I was winging over China's rugged terrain on my way to home base from a mission against Japanese ground installations, I found myself in some typical Chinese weather—thunderheads in three directions and a visibility of no more than two miles. I had flown over the country for months and knew it well—when I could see it. But today was different. Actually the terrain is pretty much the same except for a few scattered check points, and all these were hidden in the rain and storms. There was nothing to do but fly radio compass.

I had used the radio compass a number of times in the States and was quite familiar with it. So I proceeded home, flying around the storm with the radio needle always pointing toward home base. Occasionally I did a 30° turn to check radio compass accuracy, and I also checked against the magnetic compass. My flight landed safely but almost out of gas. It was only then that I fully realized how much the matter-of-fact dispatch of that "on instrument" flight depended on a bit of trial-and-error experience with the radio compass that I had gained back in my flight training.

My mind raced back to the time I had spent in advanced school at Brooks Field, Tex. It was the day for my last cross-country flight before graduation—and those silver wings. All my other cross-country tests had seemed so easy—they actually were because the weather had been perfect—so, on this last one, I decided to have a little fun.

Upon reaching Victoria, Tex., the point at which I was to begin the last leg of my cross-country, I climbed my advanced trainer to 10,000 feet, lowered my seat to bottom, and started on my merry way back to San Antonio, flying entirely by means of the radio compass. I had taken one last look around before lowering the seat, and that was the last I took until I was where I thought San Antonio should be. I had flown the exact number of minutes that should have put me over the field and it had been so easy—never once had the radio needle left center.

I was quite proud of myself as I raised the seat for a look-see—proud that is, until all that survey revealed was Texas mesquite and barren hills. My gas supply was low, so after circling once in bewilderment, I set a magnetic compass course which I followed until I found a railroad. I buzzed the railroad until I found a town labeled Mathis, Tex., which is near Corpus Christi and miles from either Victoria or San Antonio.

Almost completely out of gas, I found a hay field, checked the wind, and came in for a good forced landing. I phoned home base immediately, and when my squadron commander flew down with gasoline for me we found that the battery on my plane was completely dead. Evidently it had been all right when first I set my course for San Antonio, but it had gone dead soon after causing my compass needle to stay in the center, completely stationary. If I had only checked my magnetic compass or, better, if I had turned my plane to check for an opposite swing of the needle, all would have been well. But I was too satisfied to see that needle stay so near where I wanted it that I hadn't done anything. Flying what I thought was a direct course, I had actually made a big arc to the left.

I learned several things on that flight: (1) I had no business ever flying on instruments without an observer; (2) I should have checked my magnetic compass constantly to see if it jibed with my radio compass; (3) most important of all, I should have made periodic checks on the compass by turning 30° in one direction or the other to see if the radio compass needle would swing 30° in the opposite direction.

Needless to say, I've been heckled considerably about the incident. For the rest of my flying days I'll probably be known to intimates as "Marco Polo Van Ausdall." But the experience I gained has been worth all the chagrin it cost.

It took the "on instrument" flight I have described to make me realize just how many of these sub-conscious skills I picked up during flight training—I check everything possible automatically. END

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No wonder the Council unanimously agreed when Joe concluded, "I think we ought to get *all the facts* from Aeronca right now!"

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Al Bennett, Director of Sales,
Aeronca Aircraft Corporation, Middletown, O.
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Letters

THE NAVY ISSUE

Sirs:

. . . The October issue of FLYING presents a very vivid picture of Naval aviation and its achievements and I am reading it with much pleasure.

REAR ADM. O. B. HARDISON, USN
Glenview, Ill.

Sirs:

The special Naval aviation issue of FLYING is excellent. I know it will provide some very enjoyable reading. . . .

CAPT. R. N. MCFARLANE, USN
Washington, D. C.

Sirs:

The Naval aviation issue is a splendid job and the photographs are really marvelous. They are clear and the colors are really something to have achieved. . . .

LIEUT. COL. C. J. MCINTYRE, Signal Corps,
Chief, Special Activities Branch
Washington, D. C.

Sirs:

. . . I have shown your special U. S. Naval aviation book to a lot of my friends and they think it is tops. . . .

LIEUT. COL. HAROLD E. HARTNEY,
U. S. Army (Inac.)
Washington, D. C.

Sirs:

The October, 1944, special Naval aviation issue of FLYING was beautifully prepared and gives every evidence of the careful thought and planning which went into it. In my opinion, this edition will do much to acquaint the American people with the important role that Naval aviation is playing, particularly in the Pacific war. I feel, too, that it will serve to emphasize the necessity for maintaining an adequate Navy after the conclusion of hostilities as a guarantee for the perpetuation of peace. . . .

LIEUT. COMDR. HAROLD P. REQUA, JR., USNR
Area Public Relations Officer
Los Angeles, Calif.

Sirs:

. . . I think you are to be congratulated on the finest pictorial job covering aviation in general that I have ever seen. The Naval aviation issue was a wonderful piece of work and I shall treasure it with my other copies of your magazine.

RUSS JOHNSTON, Vice President
McCann-Erickson Advertising Co.
New York, N. Y.

Sirs:

I have just had an opportunity to finish reading your special Navy edition of FLYING and want to tell you what an impressive job I think you people have done. I can imagine the headaches and problems you must have had assembling such a volume of really worthwhile material. Frankly, I can't remember anything to compare with it. . . .

JOHN TOWER, Public Relations Dept.
Consolidated Vultee Aircraft Corp.
San Diego, Calif.

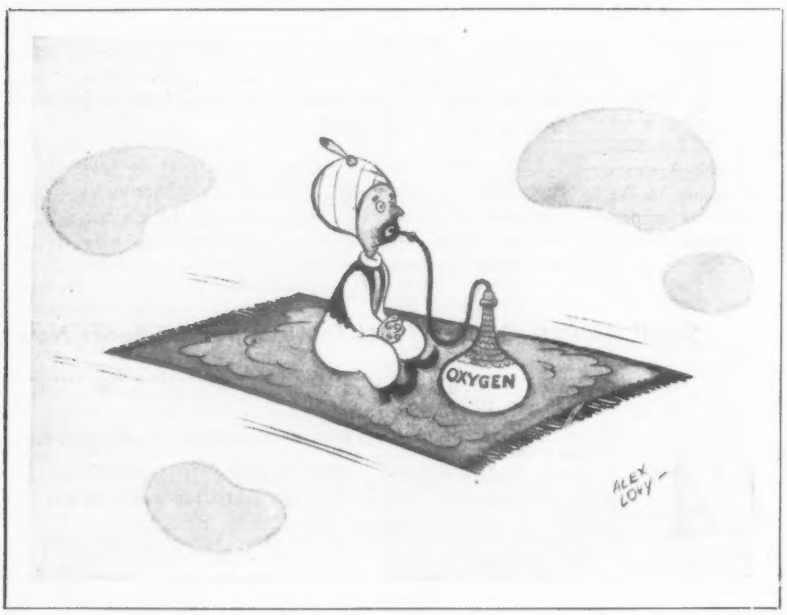
FLYING'S GIRAFFE

Sirs:

By way of interest I thought I'd pass this on to you. A *Liberator* pilot, fresh back from the China-Burma-India theater and with 101 missions to his credit, was in here yesterday with news of one of my cartoons which he found clipped and posted in a remote operations tower deep in China. It was that giraffe job [August, '43, issue]; I guess it smacked of the environment enough to warrant their keeping it. Anyway it shows how FLYING gets around.

M/SGT. TED MILLER
Mitchel Field, N. Y.

● Cartoonist Ted Miller is a regular contributor to FLYING.—ED.



CARRIER QUIZ

Sirs:

I have just read your April, 1944, Overseas Edition. In the article, "The Carrier Becomes Our Capital Ship," by Joseph A. Bors, I found a statement which I believe to be incorrect. Mr. Bors states: "There were no aircraft carriers at all in the last war. The carrier in fact was a U. S. Navy development of the early 1920's."

If my memory serves me correctly, carriers (at least one—the *Furious* I believe was its name) were used in the last war by the British Navy with the Royal Navy Air Force. I believe the planes used were Sopwith *Pups*. What's the answer? I have a wager on the matter.

LIEUT. JAMES P. GALLAGHER
Fighter Control Squadron
South Pacific Theater.

● You win your wager—depending on your definition of a carrier. One of the earliest flights at sea was made from the British battleship *Hibernia* in the early days of World War I. But there was no way to return planes to the ship except to hoist them aboard with derricks.

In August, 1917, Squadron Commander Dunning brought his landplane down on the specially constructed flight deck of the *Furious*, the first British deck landing at sea. He was killed a few days later when he again attempted the experiment.

The *Hermes*, first British ship especially designed as a carrier, proved impractical. The *Eagle*, first British "island" carrier, was commissioned for ship and flying trials on April 13, 1920. She was finally completed in 1924, at about the same time the U. S. carrier *Langley* was put into operation.—ED.

A BIT OF GEOGRAPHY

Sirs:

Here's a tip on geography for you. The engagement between the battleship *South Dakota*, the carrier *Enterprise* and enemy air forces, referred to in a picture caption of your November issue as the Battle of Vera Cruz. ["Planes vs. Battleships"], was really the Battle of Santa Cruz.

BUD FONTAINE
Chicago, Ill.

● You're right, and it's our mistake. The Navy photo caption reads Santa Cruz instead of Vera Cruz.—ED.

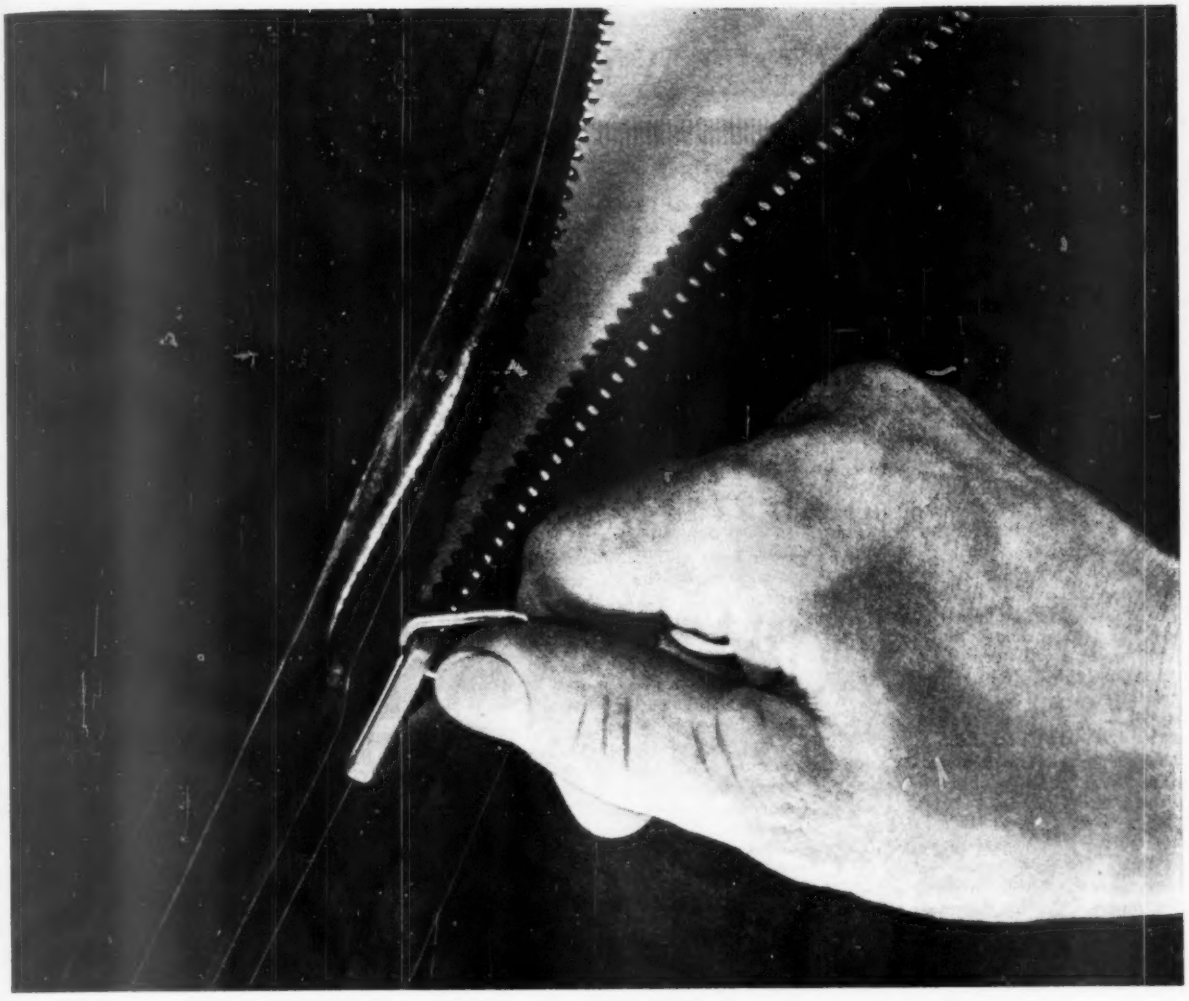
ANTI-STALL SLOT

Sirs:

On a captured German *Messerschmitt* Me-109, I noticed a sliding narrow curved plate that fitted against the leading edge of the wing. Is this an automatic anti-stall slot or a mechanical de-icer?

DONALD O'CONNELL
Waterloo, Iowa.

● It is an automatic anti-stall slot.—ED.



Just *zip it up*... to seal liquids and gases under pressure!

Perhaps *you* can use this new B. F. Goodrich PRESSURE SEALING ZIPPER

ONE ENGINEER calls it the "picket fence that doesn't leak," but the right name for this recent product of B. F. Goodrich research is "Pressure Sealing Zipper."

B. F. Goodrich engineers have taken a slide fastener and added a precision-molded rubber seal that opens and closes with the fastener. This seal is a unique arrangement of overlapping rubber lips which provides an effective and complete closure from zero pressure to pressures up to the structural strength of the fastener itself.

These zippers are effective in a wide temperature range. The rubber won't crack when bent at −70°F. nor become soft at 150°F. Weatherability is good; aging tests have shown present compound is best possible for this type of product.

One separating type and two non-separating types of these zippers are available. One seals for entire length but is open at both ends; another is closed at bottom, seals along entire length, and is open at top; third seals along entire length and at top and bottom.

Many interesting uses, aeronautical and general, have already been suggested for these unusual fasteners. Among them are aileron gap seals, exposure suit closures, weather seals, pressure duct seals and many others. Perhaps *you* have a use for B. F. Goodrich Pressure Sealing Zippers. Our engineers will be glad to discuss your applications. The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.

Skyway or Highway

B.F.Goodrich

FIRST IN RUBBER

THE LIBRARY

MARINE AND AIR NAVIGATION, by John Q. Stewart and Newton L. Pierce; published by Ginn and Company, New York, in 1944. 466 pp. Price $4.50.

In this book the authors have combined the study of two branches of navigation which heretofore have been treated separately. From its title one might imagine it to be encyclopedic in size and formidable as to content. Instead, there are only 466 pages (size 8½ by 11 ins.) of text, charts, and examples—all written in a way that should make pleasant reading for anyone interested in navigation.

The format is excellent. Profuse cuts and illustrations add clearness to textual material. The text itself strikes a happy medium in its treatment of theory. Sufficient theory is presented to give the student underlying principles governing sea and air navigation, but the book does not delve too deeply into abstractions.

The chapters on charts and vector diagrams are especially complete. The discussion in chapter three on "map projections" may even seem somewhat too extensive for a text on navigation, but it does give the student a clear understanding of what the term "projection" means. Chapter four, dealing with the Mercator, Lambert, and Gnomonic charts, is excellent. It contains not only their descriptions and instructions for their use, but it also outlines their comparative values in different areas. Three chapters trace the development of vector diagrams from the simplest type problems to the most complicated ones of relative motion.

Inclusion of 275 exercise problems with answers gives ample material for student practice. The tables essential to the solution of the problems are given on sample pages of the text. The section on "tolerances," given at the end of the book, will be of great interest to the student as well as to the practicing navigator. Altogether, the book is a credit to its authors, both educators of experience.

—CAPT. P. V. H. WEEMS, USN
Weems School of Navigation

"SAFETY AFTER SOLO," by John R. Hoyt; published by the McGraw-Hill Book Company, 330 W. 42nd St., New York City, in 1944. 356 pages. Price $3.

To wrap up everything that a student pilot should know to fly 10,000 hours safely after solo is no small task. But from his experience as a CAA inspector and more recently as supervisor of training at a large Naval air station, Lieut. Comdr. John R. Hoyt, USNR, has done a good job of explaining the fundamentals of sane flying in his new book "Safety After Solo."

The right mental attitude for safe pilots is stressed throughout the book with an emphasis on the constant need for "confident doubting"—the sage trait of old, not bold pilots to assume that something can always go wrong.

Part I has a good chapter on cross-country technique, forced landings, a sense-making explanation of how to get along with the compass. There are also fundamental descriptions of thunderstorms, fog and icing—the three treacherous weather elements.

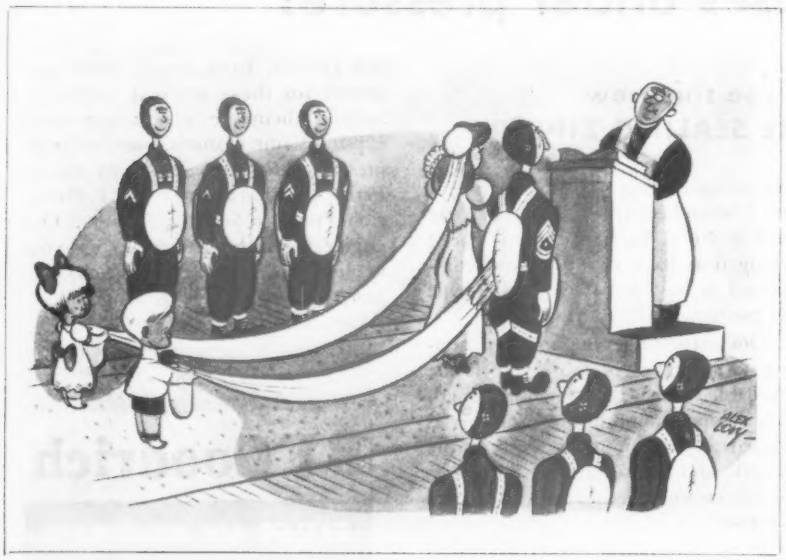
The four senses a pilot should develop —vision, hearing, touch, kinesthesia—are discussed in chapters dealing with improvement of the pilot's technique. The mathematics of turns, resultant load factors, and dangers therein leave the reader with a complete understanding of this simplest yet most trouble-producing maneuver of flight.

The third section deals with how to get a license and explains five commonly misflown maneuvers. The chapter on how to get along with the inspector should be read by all applicants. Hoyt might well have written a chapter on how arrogant inspectors can get along with the taxpayers who feed them!

The last section of Hoyt's book offers much general information on night and altitude flying and dizziness in turns, and gives additional tips to the new instructor.

Even without these latter chapters on more advanced flying, the book is useful to experienced as well as novice pilots. The reviewer, with 4,000 hours of flying to his credit, will log the next 6,000 more certainly after reading "Safety After Solo."

—WILLIAM STROHMEIER, Instructor
Hawthorne School of Aeronautics



SHORT VIEWS

HANDBOOK OF AIR NAVIGATION, by Captain-Navigator W. J. Vanderkloot, RAF Transport Command; published by McGraw-Hill Book Company, New York and London, in 1944. 333 pp. Price $1.25.

Prepared especially for those who are planning to take up the study of navigation, this book reviews in simple fashion the basic mathematical knowledge required in that study.

BASIC STRUCTURES, by F. R. Shanley; published by John Wiley & Sons, Inc., New York, in 1944. 392 pp. Price $4.50.

A scientific study of the basic principles of force transmission for all types of structures, with special application to the field of aeronautics.

AIRPORTS AND THE COURTS, by Charles S. Rhyne; published by the National Institute of Municipal Law Officers, Washington, D. C., in 1944. 222 pp. Price $5.

A complete collection and analysis of all reported court decisions involving acquisition, operation, maintenance and zoning of airports, this work aims at clarifying the Federal, state and local legislation in the airport field.

THE MAN BEHIND THE FLIGHT, by Assen Jordanoff; published by Harper & Brothers, New York. 400 pp. Price $3.50.

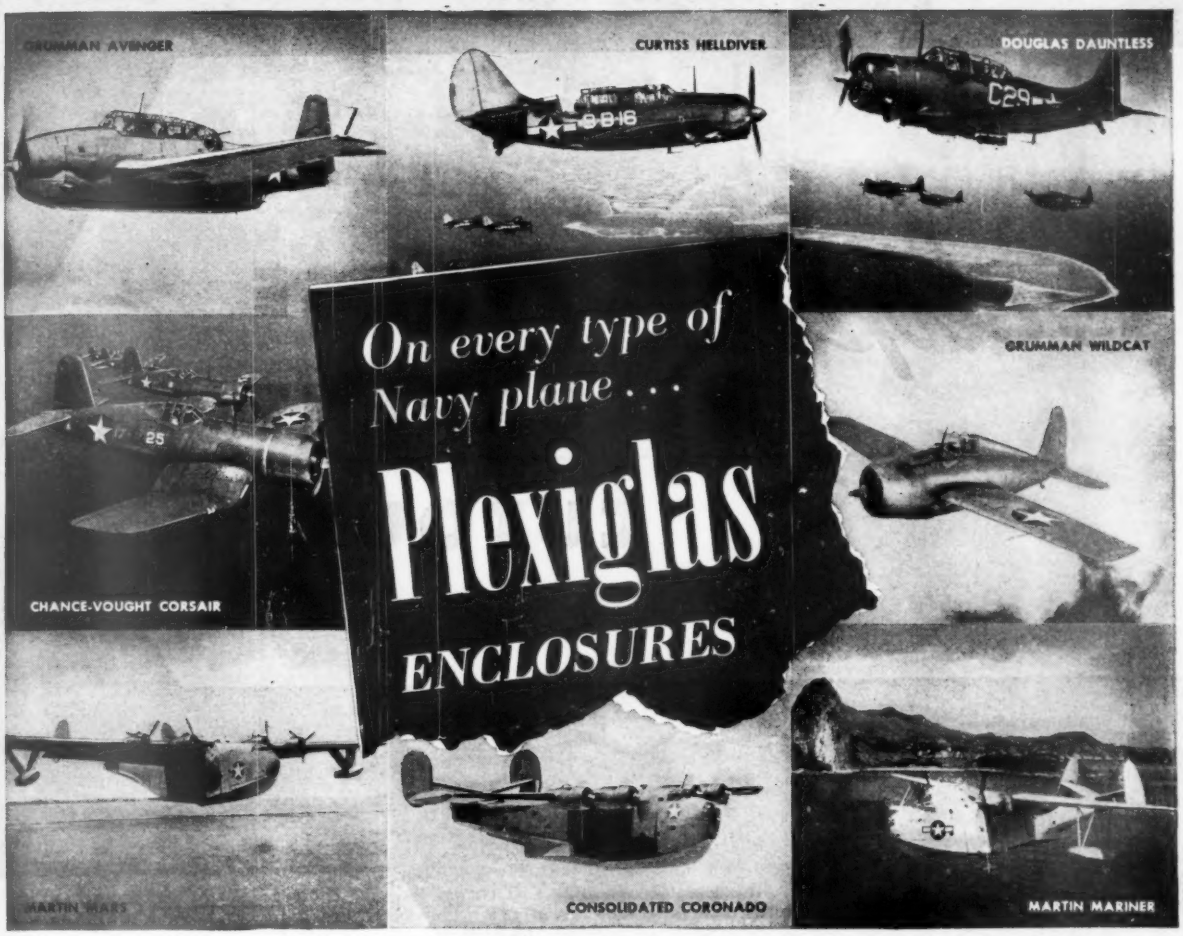
A survey course of instruction for the men who build airplanes or for those who keep them in flight. The book contains over 300 line drawings, a short history of aviation, and 31 pages of photographs.

STAR ALTITUDE CURVES, edited and published by the Weems System of Navigation, Annapolis, Md. 43 pp.

Navigation handbook prepared for AAF but equally applicable to marine navigation. Positioned for Epoch 1 January, 1945.

THE AVIATION DICTIONARY FOR BOYS AND GIRLS, edited by Leslie E. Neville; published by McGraw-Hill-Whittlesey, New York, in 1944. 190 pp. Price $2.

In words and pictures, this book defines most of the terms a youngster needs to know in order to understand modern aviation. Terms of miltary aviation and navigation are included as well as a smattering of pilot's slang.



Official U. S. Navy Photographs

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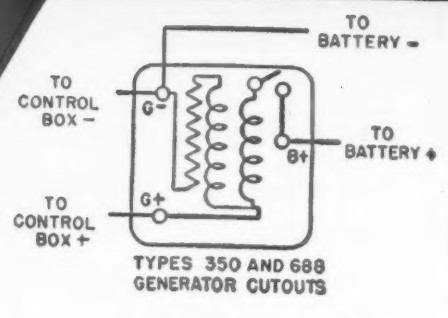
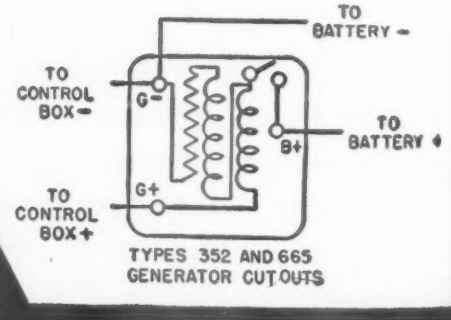
Automatically prevent reverse flow of current



TYPES 350 AND 688 GENERATOR CUTOUTS



TYPES 352 AND 665 GENERATOR CUTOUTS

THIS MONTH BUY AT LEAST AN EXTRA $100 WAR BOND

ECLIPSE

Eclipse-Pioneer Division

DESIGN CHECK CHART FOR ECLIPSE REVERSE CURRENT CUTOUTS

APPLICATION:

✓ Eclipse Reverse Current Cutouts are designed to prevent the reverse flow of current to generators in aircraft power systems utilizing batteries and generators as a power source.

✓ Properly installed in the Aircraft Power Supply System, they provide a compact, lightweight means of automatically disconnecting generators from electrical systems when generator voltage drops below system voltage.

PERFORMANCE:

✓ Eclipse Reverse Current Cutouts automatically open on reverse flow of current* from battery to generator when generator output voltage drops below system voltage. They also operate as generator automatic main switches.

Eclipse Type	Current-Amperes	Volts D.C.	Setting Volts	*Opening Reverse Current-Amperes	Weight Lbs.	Dimensions—Inches Width	Length	Height
350	25	15	13.5+.1	3	.82	2 1⅜6	2 1⅜6	2¼
352	100	15	13.5+.1	5	1.63	3¼	3¾	2⅝
688	25	30	26.7+.1	3	.82	2 1⅜6	2 1⅜6	2¼
665	100	30	26.7+.1	5	1.63	3¼	3¾	2⅝

DESIGN FEATURES:

✓ Changes in Cutout temperature have minimum effect on operation.

✓ Operate satisfactorily in any mounting position when adjusted in that position.

✓ Armature leads on Types 352 and 665 are shielded to prevent change in Cutout setting through handling.

✓ Silver alloy contacts have long life and low voltage drop.

✓ Adjustment knob is conveniently accessible and automatically locked.

✓ Lightweight and compact.

Bendix

AIRCRAFT OWNERS AND PILOTS ASSOCIATION

AOPA NEWS

The Aircraft Owners and Pilots Association (AOPA), with National Headquarters Office located in the Carpenters Bldg., Washington 1, D. C., is a non-profit organization composed exclusively of pilots. It looks after the pilot's best interests in all phases of aviation and helps individual pilots with their individual problems. The AOPA operates with a full-time professional staff and is the largest group of civilian pilots in the world. This column is edited by the Aircraft Owners and Pilots Association and opinions contained in it are not necessarily those of FLYING. A special bulletin is sent each month to all registered AOPA pilots and also confidential newsletters from AOPA's Washington staff are sent members from time to time.

UNFAIR AIRPORT RULING

INCREASING dissatisfaction has been expressed to AOPA officials regarding the ground rules for designating civil airports. Chief complaint seems to be on the policy of airport separation.

Civil Air Regulation 60.95, which sets forth actual requirements based on security needs, contains nothing that relates to the distance which should separate airports from other airports or airports from city centers.

Many persons contend that *any* separation rules are undesirable and handicaps the program of (1) building airports close to city centers which will bring utility to personal aircraft; (2) effecting necessary segregation of transport and non-scheduled by providing *convenient* alternate landing facilities; and (3) decentralizing air traffic from one "principal airport" to *many* small *landing areas* within and adjacent to city centers.

It now seems apparent that section 60.95 of the Civil Air Regulations, which gives the Administrator of Civil Aeronautics the power to permit or prohibit a civil airport from opening, is being used as a means of enforcing some form of airport separation policy.

This could become a vicious instrument of obstruction to private aircraft landing facilities.

There is already evidence that something is amiss according to operators' reports received by AOPA which cite "arbitrary decisions" in connection with CAA's unwillingness to designate airports even though they meet all of the published security requirements.

AOPA feels that it is time to put all cards face up. If there are unwritten rules which affect airport designations, let's let everyone know about them and why they are necessary and if they are necessary. Recent publicly announced relaxations of internal security and defense measures raise a fair question: Why can't we rescind all of CAR 60.95?

We think that a straightforward review and public clarification by the Government bureaus and agencies concerned would have beneficial results, for it would either satisfy the flying public that reasonable and necessary rules are being applied or it would honestly reveal that there are basic faults which could then be corrected.

SECOND REVISION, CAR PART 24

In the AOPA *Pilot* this month members will find a summary report of the newest proposals of the Civil Aeronautics Board regarding mechanic license requirements. AOPA pilots are urged to submit opinions to AOPA's Washington Office immediately. Pilot readers who are not members of AOPA may obtain a copy of the current AOPA *Pilot* by sending such a request to the address indicated at the head of this page.

The proposed revisions, if passed, would create more licenses for mechanics and prohibit private aircraft repairs, unless mechanics hold currently effective certificates of various types dependent upon the part of the aircraft to be repaired.

PUT IT IN WRITING

AOPA's staff reports a great increase in the number of membership requests for assistance in entangling aircraft purchase agreements. Often these involve a breach of oral agreement between a purchaser who has made a down payment and a seller who later fails either to deliver the plane or refund the deposit. The situation is further aggravated by an unfortunate delay in the CAA's Certificate Section in keeping their ownership records up to date.

Frequently persons are found who have neither a sales receipt or sales agreement in writing, not even a receipt for deposit.

Meet Lieut. Ralph L. Kirbery, of Miami, Fla., who is AOPA charter member No. 263.

Here are some simple rules which will help all prospective purchasers:

(1) Don't buy an airplane unless you *see* it; (2) if possible, fly the airplane; (3) ask to see certificate of ownership (title), license or airworthiness certificate, and a copy of the last bill of sale. If the seller can't produce these, go no further with your negotiations.

If satisfied that ownership is properly established and that aircraft is airworthy, then (4) pay a good mechanic five or ten dollars to inspect the ship and engine carefully, including a study of logbooks.

If inspection is satisfactory, then (5) get a dated and signed sales slip specifying in detail the total purchase price, amount of down payment, the balance due, *when* it is due, and the date upon which the aircraft is to be delivered.

The sales slip should *always* include in itemized form all extra equipment together with manufacturer's serial numbers for both aircraft and engine. If seller agrees to do work on aircraft before delivery, an exact description should be indicated with a statement as to whether cost of work is included in purchase price or whether purchaser is to pay. In the latter case an itemized cost estimate should appear.

(6) If a deposit is made, obtain a separate receipt. This is particularly important if transaction is paid for in cash. The receipt should indicate whether the deposit is refundable in the event the plane is not delivered or accepted for delivery.

In short, be wise and ask for proof and for written contracts. A *reliable* dealer or individual seller will always be glad to give them to you, for he knows that he will also benefit by conducting business in this manner. If the seller hesitates to cooperate—*look for another airplane.*

CONGRESSMEN REPORT ON PRIVATE FLYING

One of the highlights in the recent Congressional report on civil flying was the condemnation of restrictive state regulations propounded by state aviation commissions in the interest of "promoting civil aviation." We have previously reported to members that last year alone over 1,000 bills were presented in the state legisiative halls.

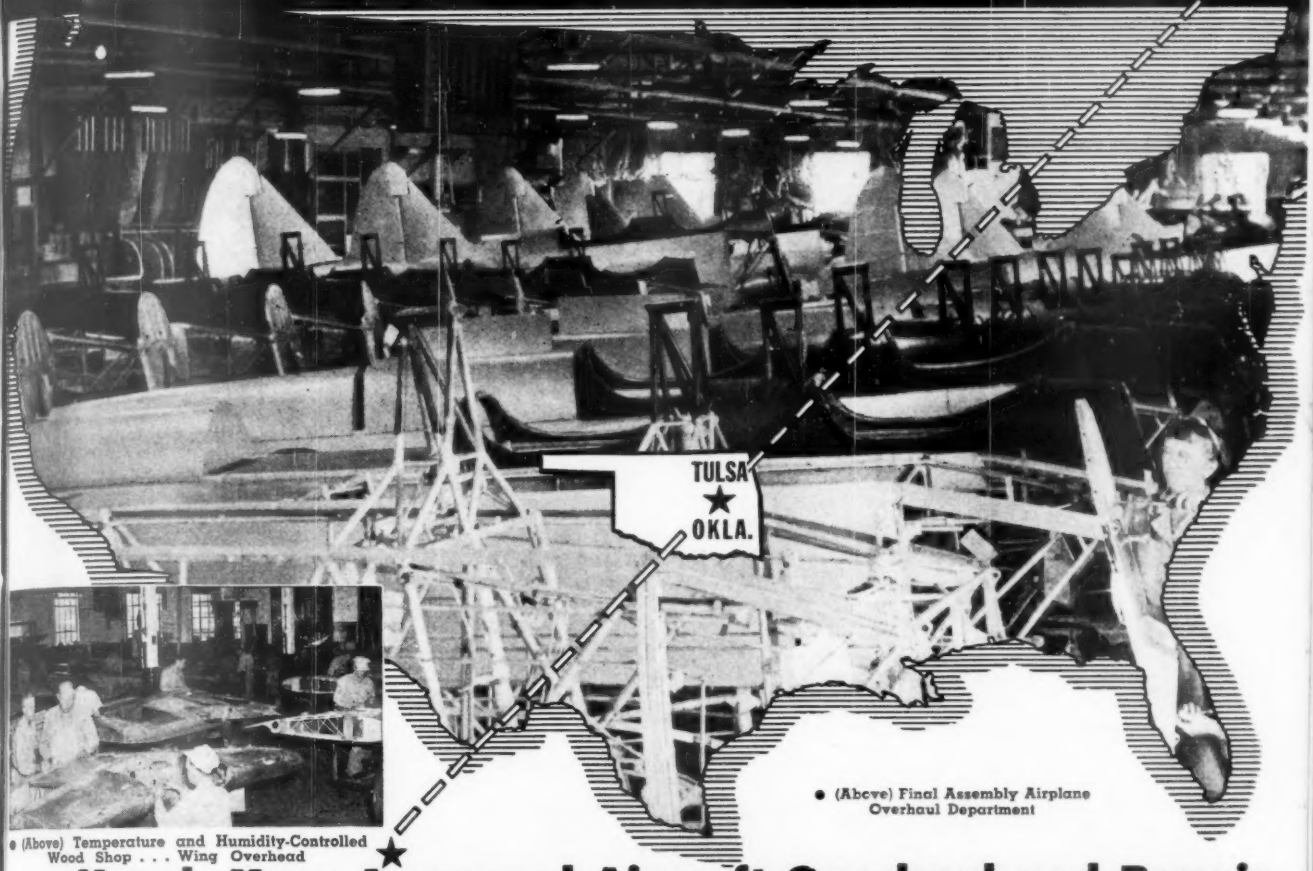
There is nothing in the record of aviation which indicates a necessity for any state to set up its own standards. Such a process could result only in additional confusion.

AOPA feels strongly that we have achieved nothing if, after successfully fighting for revision and simplification of federal air-traffic rules and such, we become victims of *state legislationitis.*

Only an alert flying public can prevent such a contagion. All pilots and aircraft owners are threatened by the spread of state legislationitis. The time to act is now before it develops into epidemic proportions.

The Congressional report also calls for utility in non-scheduled landing areas and low-cost safe airplanes. The report is not long and many AOPA members will wish to obtain a copy by writing to the Document Section, U. S. Capitol, Washington, D. C. Ask for a copy of Report No. 1893, Union Calendar No. 617. END

Attention: Private Aircraft Owners ★



• (Above) Temperature and Humidity-Controlled Wood Shop . . . Wing Overhead

• (Above) Final Assembly Airplane Overhaul Department

Here's Your Approved Aircraft Overhaul and Repair

• (Above) Landing Gear Overhaul and Assembly

• (Above) Spray-Painting Airplane Control Surfaces

Here in the heart of the nation is the expert trustworthy overhaul and repair service on which private aircraft owners can depend . . . *now and in the peacetime future ahead.* SPARTAN AERO REPAIR is 100% Government Approved—one of the highest rated in the nation—with the most extensive and modern facilities in this part of the country!

The Airplane Overhaul Department pictured here is equipped for the repair and overhaul of everything on the private airplane whether it be of wood, fabric or metal construction. You'll find a corps of expert workers in all of its various service departments: the final assembly department—the air conditioned and humidified wing overhaul woodshop and wood storage—the landing gear department—the dope shops, etc.

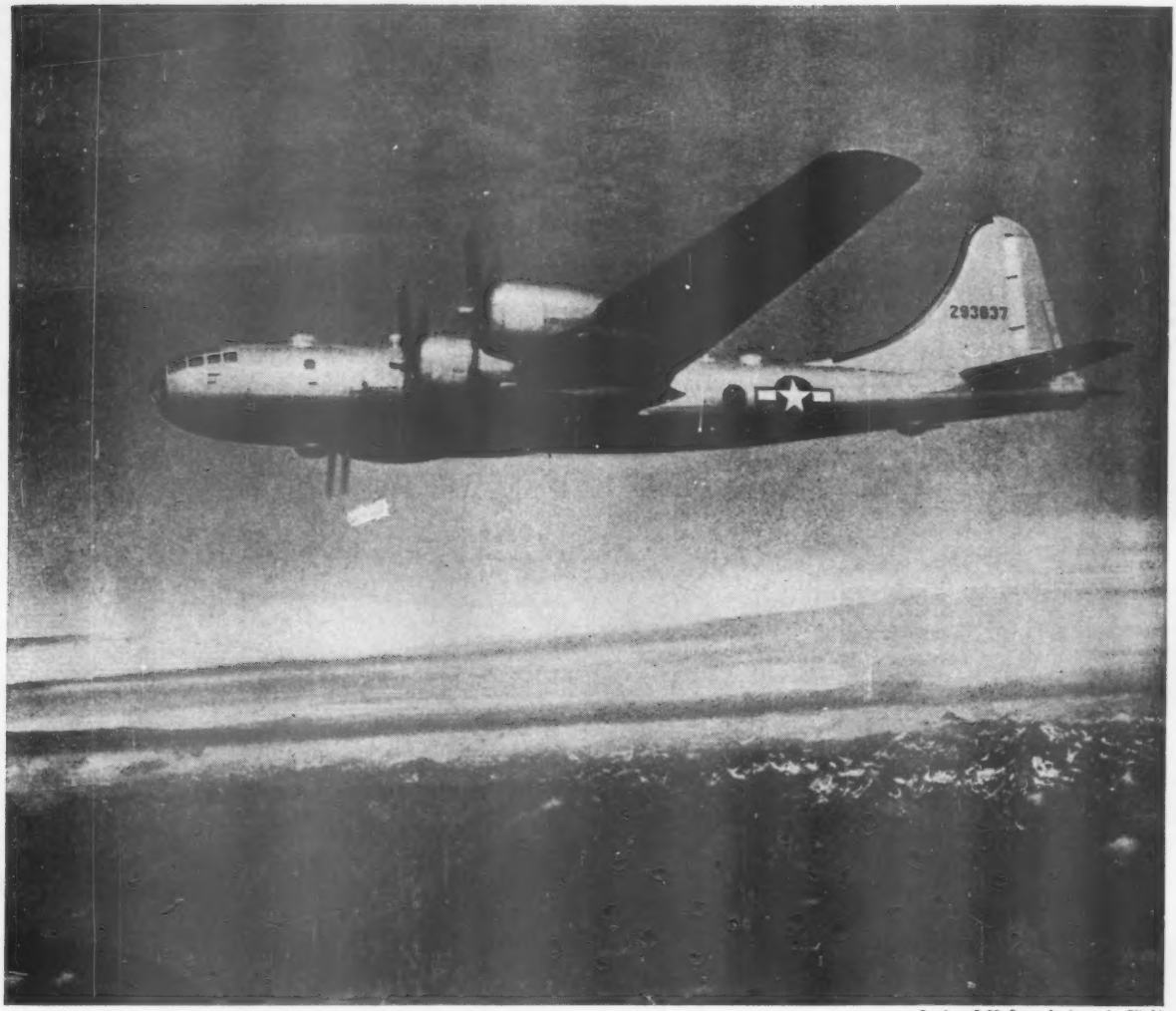
SPARTAN AERO REPAIR also provides expert service for all component parts of planes—superior engine test stands—latest test equipment for engines and accessories—entirely complete instrument shop and radio shop.

WRITE FOR NEW CATALOG giving complete information about the wide scope of service provided at this great commercial repair station.

SPARTAN AERO REPAIR

Division of SPARTAN AIRCRAFT COMPANY

TULSA, OKLA. Established 1928



Boeing B-29 Superfortress in Flight

Size alone wasn't enough

The Army wanted an airplane that would carry a *heavier bomb load . . . farther, faster* and *higher . . .* than any had before.

Size alone wasn't enough. There were already single, experimental models of massive airplanes; but they lacked the required speed and altitude.

There were also high-performance airplanes. But these were small, lacked long-range and load-carrying ability.

The problem of combining both extremes in one airplane was put before America's aircraft industry. One company, Boeing, was in an exceptional position to meet the Army's requirements, because of its background of pioneering work in developing such four-engine airplanes as the B-17 Flying Fortress, the B-15 Bomber, the Stratoliner and the Pan American Clippers.

The Boeing design was accepted. And then, even before the first experimental model had been completed and tested, the Army committed the Boeing Superfortress to one of the greatest manufacturing programs ever placed behind any weapon of war!

Seldom has such engineering and production responsibility been given to *any* organization. It meant that the new plane *had* to be right; that no basic design changes could be made. It meant that Boeing had to work out the manufacturing plan of the B-29 at the same time it was completing the engineering design—and had to furnish full information about both to the companies which had been selected to help build it.

Success in planning and executing every step of the entire Superfortress program was imperative because of the important military plans built around it. Following the first B-29 operation, the Secretary of War said: "The new long-range bombers have overcome the tremendous barriers of distance to bring the heart of Japan under the guns and bombs of the Army Air Force."

When peace finally comes, Boeing principles of research, design, engineering and manufacture will again be applied to products for your use. True now, it will be equally true of any peacetime product . . . if it's "Built by Boeing" it's bound to be good.

DESIGNERS OF THE FLYING FORTRESS • THE NEW B-29 SUPERFORTRESS • THE STRATOLINER • PAN AMERICAN CLIPPERS **BOEING**

A NEW AVIATION CATALOG!

Weatherhead "A-N" Fittings—Now and Postwar

The Weatherhead Company were pioneers in the manufacture of aircraft fittings. Many of the most important design changes on aircraft fittings were originated by Weatherhead. Our facilities, now and *in the future,* will be directed to the volume production of high-quality fittings, hose assemblies, valves, and actuating cylinders. All of the necessary designs, specifications, and photographs on these products are contained in our new Aviation Catalog.

SAVE TIME SAVE MONEY SAVE EFFORT

Write for this handy source book today.

SIX SECTIONS
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- **AN Fittings**
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Weatherhead Engineers will be glad to work with you to solve your fittings and hose assemblies problems. Our new Development Laboratory is at your disposal for the creation of new fittings and other products to meet your special requirements.

Look Ahead With

Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND, OHIO

One of the Oldest and Largest Manufacturers of Vital Parts for the Aviation Industry

America's World Air Routes

(*Continued from page 33*)

Service should be translated after the war into a peacetime, commercial enterprise.

They didn't know where they stood with Berle. The memory of the Caribbean maneuver, whereby several foreign airlines were admitted temporarily to Miami to relieve a traffic jam, gave them cause for misgiving, they thought. They themselves had been turned down on their applications for temporary, limited-distance foreign commercial operating rights out of Miami.

In the future, would they be confined by a Mercator philosophy to continental United States operations while foreign airlines were permitted to compete with Pan American Airways at coastal gateways? Or would America no longer countenance the pre-war system which had seen its domestic airlines stopping at geographical borders that would be meaningless after the war as far as aviation was concerned? On behalf of Berle, it may now be speculated that he wanted to produce a psychological effect on the foreign air carriers and their governments that would be of value to this country in negotiations for landing rights after the war.

This was a time, too, when the position of Pogue was underestimated. Some airline executives feared he was more subject to the influence of Berle than vice-versa. And this they judged to be bad. It would be incorrect to infer from the foregoing that Pogue was held in anything but the highest esteem by the airlines. He has a record for having consistently held their confidence. But in those hazy days it was not clear that Pogue was to become probably the principle motivating force in formulating post-war air policy.

Skip over now to the fall of 1944. The domestic air transport business has a friend in Berle. Some airline executives remain a bit skeptical but most have praise for what he has been doing in behalf of American aviation. The business knows, too, that Pogue, with carte blanche from the White House, is the man to whom major credit will go for acting within his sphere to assure America a predominant position on the worldwide airways.

A Government air policy has been developed which has the approval of the President, every Government department concerned, the armed forces and the domestic airlines. Opposing portions of the policy stand only Pan American Airways, the pioneer American carrier in the foreign field which is fighting to maintain its supremacy; United Air Lines, in lesser degree; and some members of the Senate Commerce Committee which has been investigating post-war air matters intermittently for about a year.

Cornerstone of the policy is the announced intention to extend American air routes around and up and down the globe wherever America is likely to do business. The American flag must be carried throughout the world, spreading the nation's prestige. Maximum commercial flying over the most extensive system of air routes possible must be undertaken to assure continuous technical advancement and a far-flung communications network in the interest of national security. Aviation must be made to work for peaceful promotion of international commercial relationships.

It is Washington's aim to obtain, where necessary, the consent of other nations to operate these routes, to fly through the air space of foreign countries, to land for technical purposes wherever desirable, to receive national and most favored nation treatment at airports designated by foreign countries as international traffic centers, to arrange for discharging and picking up traffic at agreed commercial ports of entry.

To do this it will be necessary to grant reciprocal rights to foreign countries requesting them and the executive branch of the Government is willing to do that, realizing that only on a reciprocal basis can post-war air transport become an instrumentality for the preservation of peace.

There are arguments against details of the administration's policy, arguments which are heard daily from those who favor a chosen instrument and individual company negotiations with foreign Governments for landing rights. These arguments, in some respects, are potent but they are not pertinent to the objective here.

Berle went quietly to work, early in 1943, to determine how best to plot America's post-war course. He began his work six months before domestic airlines began their chant for "free and open competition—worldwide," a chant they have now modified to "regulated competition," which is what they always meant.

Early in January, Government leaders agreed the time was at hand to formulate air policy. President Roosevelt and Secretary of State Hull approved, asking that recommendations and conclusions be forwarded to them. Thus it was that the Interdepartmental Committee on Aviation came into being in January, 1943.

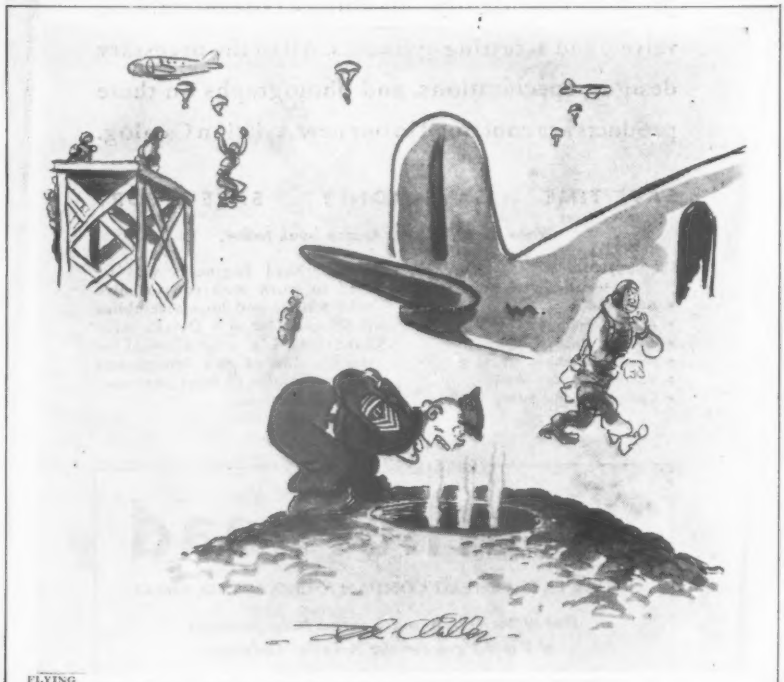
A subcommittee was appointed under Pogue's chairmanship and for the next five months it studied every conceivable phase of America's relation to the post-war international air pattern.

On June 19, 1943, the subcommittee completed a report which was delivered to the full committee and, with revisions, forwarded to the President, Secretary of State and Senate Commerce Committee. Later remarks of Mr. Roosevelt indicated that he followed closely the conclusions of the Interdepartmental Committee, although they have never been made public in their entirety.

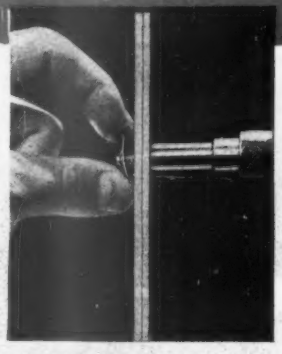
During the subcommittee meetings Pogue decided that, first and foremost, America must let the world know what it wanted to do with its commercial air system. The interdepartmental group, engaged upon an exhaustive examination of desirable post-war international arrangements from both political and technical standpoints, had neither time nor facilities to do a detailed job of air map making.

But it is interesting and significant that certain tentative routes were suggested as follows: (1) the service presently authorized to the United Kingdom, France and Portugal; (2) a service to the United Kingdom, France, Italy and Southeast

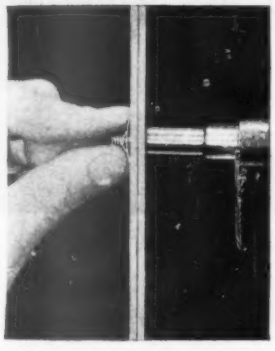
(*Continued on page 96*)



"Very good for a first jump, Private. Now let's remember our chute next time!"



STARTING POSITION



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● This ad is devoted to speed. The word appears 5 times in this message because we want to stress speed first and foremost.

Why? Because you will need better and faster assembly speed in order to win postwar markets in big volume on any product—metal, wood, or plastics.

Designing beautiful postwar products is only the beginning. The winners will be those good looking products that are engineered for better and faster assembly. We have already produced over 2,000 shapes and sizes that have drastically cut assembly time, reduced costs and improved the quality of the finished product. Write for literature.

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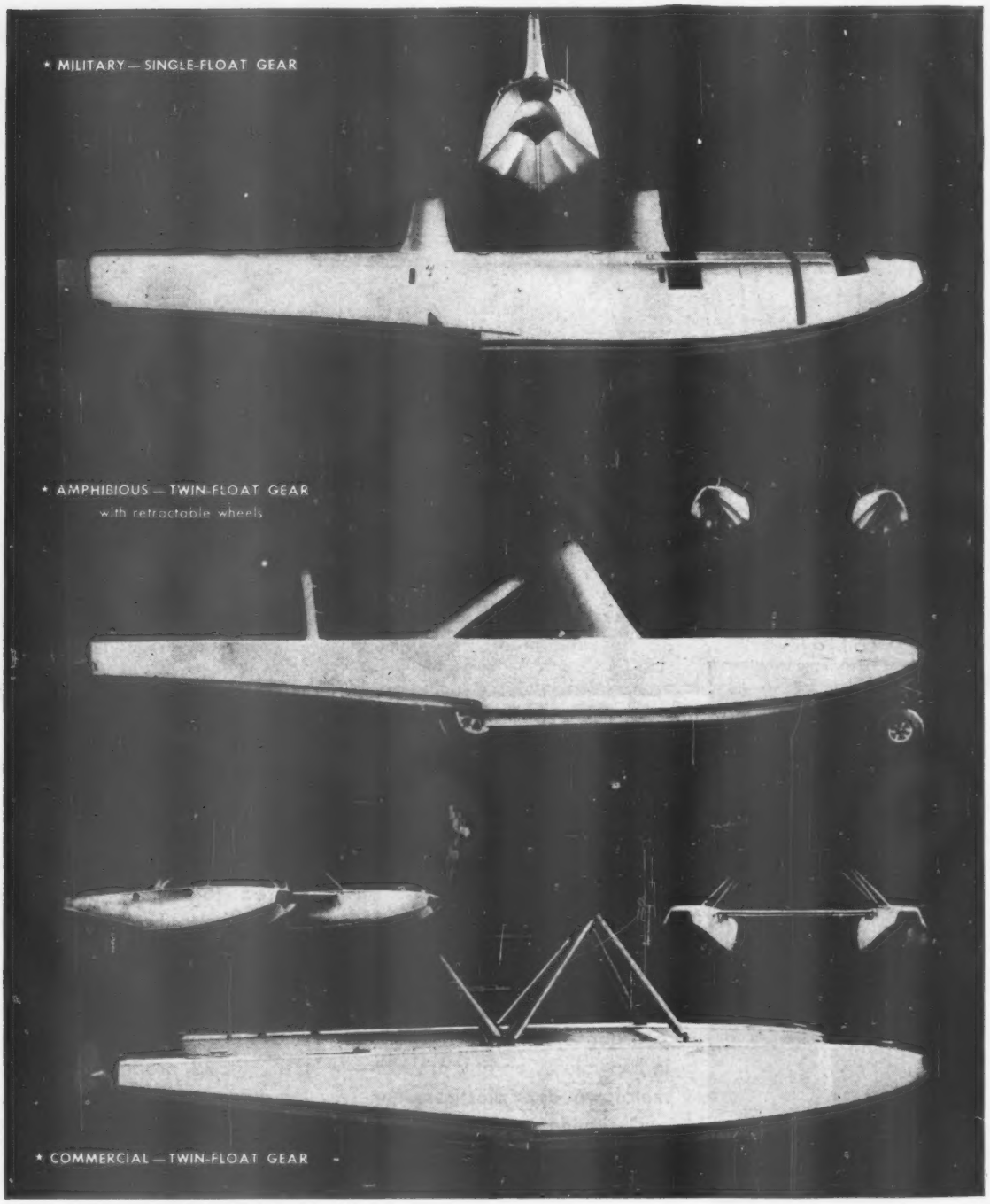
EDO FLOAT GEAR

All-metal seaplane floats for every type of aircraft



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Contractors to the U.S. Navy and U.S. Army Air Forces and Allied Governments

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First AMONG CAMERA MANUFACTURERS TO RECEIVE THIS SIGNAL HONOR!

WAR DEPARTMENT
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Subject: Quality Control Classification

To: Fairchild Aerial Camera
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U. S. ARMY AIR FORCES' *Approved Quality Control Rating*

This new "Approved Quality Control Rating" is the U. S. Army Air Forces' official expression of confidence. It is assigned to a manufacturer who has demonstrated that its own inspection organization can be entrusted with full responsibility for meeting all requirements of the Army Air Forces. *It eliminates all future need for duplicate Air Corps inspection during fabrication of the product.*

This new honor is a well-earned recognition of the unremitting vigilance of the men and women at Fairchild. Always uppermost in their consciousness is the vital role which Fairchild Aerial Cameras perform in our war effort. Thus they have given unstintingly of their energies not only to produce these cameras in the required quantities, but also to maintain the Fairchild reputation as "the Aristocrat among Precision Cameras."

Fairchild CAMERA AND INSTRUMENT CORPORATION

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THE STORY OF AERIAL PHOTOGRAPHY IS THE STORY OF FAIRCHILD CAMERAS

(*Continued from page 92*)

Europe; (3) a service to the United Kingdom, Holland, Germany and Poland; (4) a service to Norway, Sweden and Russia. Two of these, committeemen assumed, would be routed via Canada or Newfoundland and at least one would continue beyond Europe and around the world via India and China. The committee at that time expected that reciprocal services would be requested by Canada, United Kingdom, France, Holland, Russia and the Scandinavian countries.

Pogue set his Economic Bureau the task of developing tentative United States overseas air service patterns, as they were called, for Latin America, the North Atlantic, the South Atlantic, the North Pacific, Central Pacific and Australia.

The Army and Navy had fallen in with the entire procedure, as had all other departments concerned. Pogue had a green light from President Roosevelt.

He realized that no map of the United States' proposed post-war air routes should be drawn without assistance from the nation's airlines and any other persons or groups interested in transportation. So, on May 4, 1943, a comprehensive questionnaire went out from the CAB, "after consultation with the interdepartmental committee," containing 17 questions each of which might have given the recipients an excuse to write a book.

The first of these was: "What international air routes are of major commercial importance for post-war United States operations?" It was clear that replies not substantially supported would receive small consideration. In replying to that question, the CAB informed those questioned:

"A complete map recording a judgment as to the routes most desirable on the basis of commercial considerations and operating factors would be helpful. The map might well be accompanied by an analytical commentary on the relative importance of the routes for early operation, the trading centers at which commercial rights are most desired, and technical operating factors in relation to existing and prospective types of flying equipment."

The 16 other questions were just as tough. The Board received 40 or 50 replies, but again on September 2, 1943, it asked "interested persons" to contribute their ideas about desirable routes. The second questionnaire explained:

"The Board currently is engaged in considering what international air transport routes appear likely to be especially important to the United States in the post-war period." By that time, upwards of 100 applications for foreign routes were on file with the CAB, and it was proposed that the answers to the two questionnaires would be used in the studies being prepared as a basis for consideration of those applications. Again the Board stressed that "supporting analyses and data" were desired.

Meanwhile, F. H. Crozier, chief of the Board's research and analysis division and a veritable wizard in the abstruse business of determining where profitable air paths might lie, had set in motion the full machinery of his shop along lines laid down by Pogue.

Presently Crozier emerged with a body of facts and statistics of monumental proportions, thoroughly documented. Two of those reports have been released, one on Latin American transport, the other on the transatlantic. Others are held against the time when hearings on transpacific applications begin.

A dominant theme in Crozier's reports is that the United States originates upwards of 80 per cent of air traffic to and from this country. There is herein an implicit urge that the United States, therefore, not limit its international frequencies in line with proposals of some foreign nations, but that this country move boldly to capture for its airlines all the traffic it can generate. The major business available to U.S. airlines, Crozier's reports show, will come from traffic interchanged between this and other nations, although he feels that on several segments of foreign routes there will be a profitable market, particularly in some parts of Latin America.

Latin America, Crozier emphasizes, offers perhaps the best field for advancement of aviation because of poor surface travel conditions. But he likewise is emphatic about the fact that 40 carriers, exclusive of American, operate over 93,500 miles in Latin America, and that Pan American and Panagra together carried only 179,847 of the 665,771 passengers who travelled in Latin America in 1941, or about the number carried by a medium-sized domestic airline. He says that air service in Latin America in 1941 was in a "much less mature developmental" stage than it was in the United States, pointing to infrequent schedules, lack of night flying and substantially higher passenger fares.

He evidently feels that competition would provide better service among American carriers in Latin America, but by no means does he see a wide open field. And he shies away from criticism of Pan American and Panagra, saying the

(*Continued on page 100*)

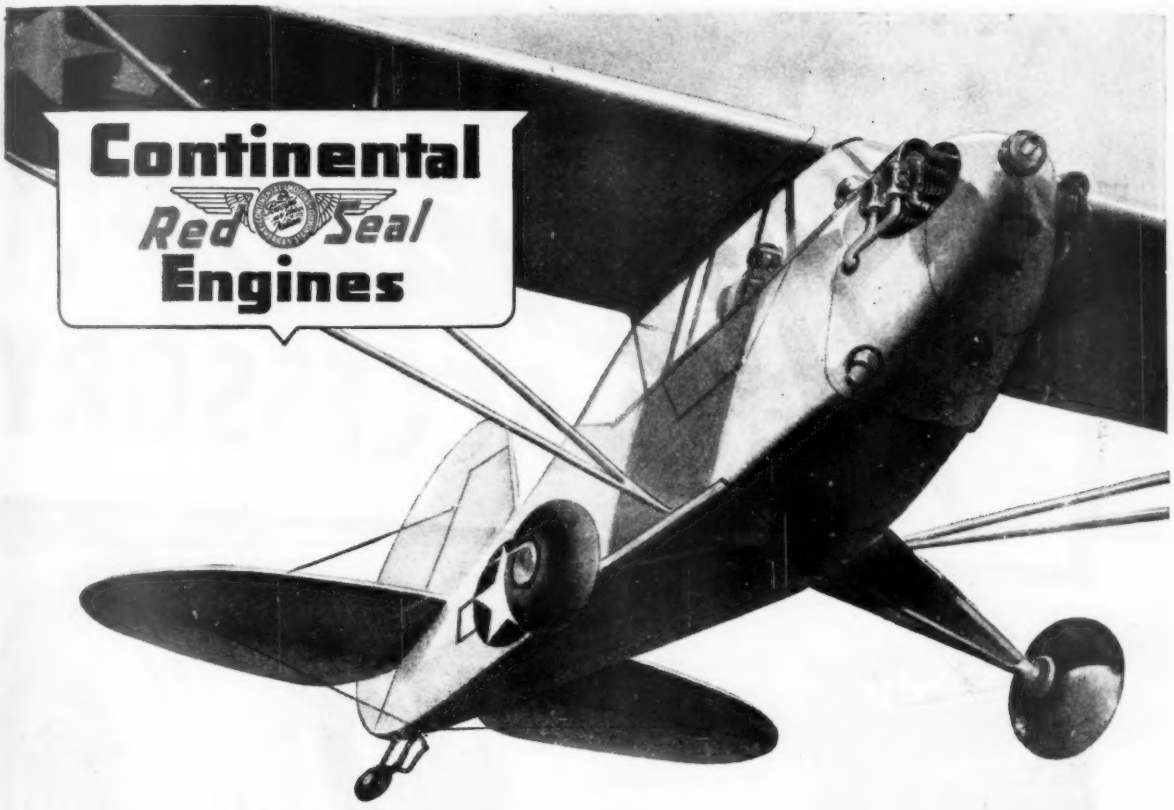
Commercial Commando

CURTISS-WRIGHT Corporation is engineering in mock-up form a 36-passenger commercial version of the *Commando*, largest twin-engined military transport in the world. Identified as Model 20E, the converted plane will incorporate improvements in power plant, engine accessibility, flight comfort and control surfaces.

Only modification in air-flow lines will be the plane's new nose. Current *Commando* models have windshields and side windows that do not break the contour of their streamlined nose cones. The new plane will have a "dolphin" nose (see cut) which will enlarge the pilot's angle of vision.

Model 20E will have a normal gross weight of 48,000 pounds, including a useful load of 15,900 pounds—cruising speed of 234 m.p.h. at 60 per cent of power at 10,000 feet, and will take-off, climb and cruise on one engine. For passenger comfort, it will offer automatic cabin ventilation, reading lights, kitchenette, two lavatories and other modern features.

First of a series of transport planes Curtiss-Wright plans to introduce, 16 of the new planes have already been contracted for by National Airlines, and three other domestic lines contemplate using them.



POWER TO WIN

The newest plane carrier, an LST converted into a flat-top by the use of a portable landing strip, can carry eight Continental powered "Grasshopper" planes. These speedy observation planes with their dependable Red Seal Power are fast on the take-off, highly maneuverable, and are effectively used to spot enemy positions.

However, this is only one of the many applications of Continental Red Seal Power — the Power to Win — which has contributed so much on all fighting fronts.

ARMY E NAVY

Awarded to the Detroit and Muskegon Plants of Continental Motors Corporation for High Achievement

Your Dollars are Power, too!

Buy War Bonds and Keep Them!

Continental Motors Corporation

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MUSKEGON, MICHIGAN

Attention! ACCESSORY

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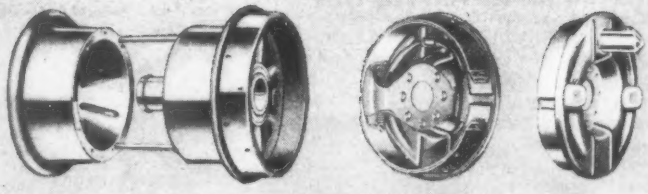
WHEELS AND BRAKES

Firestone AIRCRAFT COMPANY

TIRES, TUBES, WHEELS, BRAKES, AIRSPRING LANDING GEARS, BATTERIES
VELON SEAT COVERINGS, FOAMEX CUSHIONING, FUEL AND OIL CELLS, BUSHINGS

AIRCRAFT DEALERS!

Here's Another Firestone FIRST...

A New Franchise that Builds Your Business and Assures MORE PROFIT!

FOR many months Firestone, while producing for war, has also been preparing for peace. And as a first step in its postwar plans, Firestone announces a new franchise for aircraft accessory dealers which provides them with a wide variety of high quality merchandise that their customers want and need — tires, tubes, wheels, brakes, brake lining, batteries, spark plugs, finishes and many other products for their planes — jackets, gloves, sun glasses and numerous other items for themselves. And after victory, many other products may be added to the line — radio transmitters and receivers, radio direction finders, binoculars, field glasses, cameras and other equipment that private flyers will require. So sign up NOW with Firestone, the *first* Company to provide aircraft accessory dealers with a complete franchise. For full information, write or wire — or phone HEmlock 1671, Akron 17, Ohio.

For the best in music, listen to the "Voice of Firestone" with Richard Crooks and Gladys Swarthout and the Firestone Symphony Orchestra conducted by Howard Barlow every Monday evening over NBC network.

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Here's the franchise that means bigger profits for you!

Firestone
AIRCRAFT
DEALER FRANCHISE

AIRCRAFT TIRES and TUBES
BATTERIES – BRAKE LINING – SPARK PLUGS
WHEELS, ACCESSORIES and SUPPLIES

Firestone AIRCRAFT DEALER FRANCHISE

AGREEMENT between Franchise Dealer..... and Company, of .....
The Firestone Tire & Rubber Company, covering Firestone Aircraft products, dated.....

1. Company grants Franchise Dealer the right to sell Firestone Aircraft products—conditions shown below. In consideration, Franchise Dealer agrees to buy from Company, and maintain, stock of Firestone Aircraft products, to vigorously merchandise them, and to conspicuously display Firestone signs.

2. Franchise Dealer shall be entitled to Company's regular Dealer Prices in force at time any order is shipped. If prices advance before shipment, Dealer may cancel order.

3. Company agrees in case of a reduction in its Dealer Prices concurrent with a similar reduction in its suggested consumer prices, to rebate the Franchise Dealer by merchandise credit, the difference between the former Dealer Prices and the reduced Dealer Prices on Franchise Dealer's net purchases of all Firestone Aircraft tires and tubes, made from Company at the former Dealer Prices during the thirty days prior to the date such price revision becomes effective.

4. Franchise Dealer accepts all responsibility for the placing and condition of any signs furnished by Company and agrees to hold Company harmless by reason of the use of such signs. Upon termination of this Agreement, Franchise Dealer agrees to surrender to Company all signs and other property belonging to Company and to discontinue immediately the use of Company's name. Company shall have the right to enter upon Franchise Dealer's premises and to repossess or remove all signs showing a representation of Firestone.

5. The conditions upon which this Agreement is made are recited in detail on the back of this sheet, with the same values and effect as if fully set forth in the body of this Agreement.

This AGREEMENT is not subject to oral change. It is to be construed under the laws of the State of Ohio, and becomes effective when signed by the Company's District Manager, continuing in effect, unless terminated by either party on thirty days' written notice to the other, or, it may be cancelled immediately upon violation of its terms.

THE FIRESTONE TIRE & RUBBER COMPANY, Akron, Ohio,

By.....
District Manager

ACCEPTED:
.....
Franchise Dealer

THAT MARK OF QUALITY AND SYMBOL OF SERVICE

AKRON, OHIO; MAKERS OF SPARK PLUGS, HOSE CLAMPS AND MANY OTHER AIRCRAFT SUPPLIES

(*Continued from page 96*)

domestic system had publicly financed airports and airways not available to the foreign carriers and did not encounter the same difficulties and complications.

Crozier makes no recommendations as to specific new routes for Latin America, but he suggests the Caribbean, including Colombia and Venezuela, as the most remunerative area. His formula was to show the shortest air tracks between Latin America and selected United States gateways via route segments 500 miles over land, 700 miles over water.

These influences, in Crozier's opinion, will determine the growth of air service in Latin America: degree of mutual understanding and goodwill among the various countries, level of mutual prosperity, degree of economic, social and cultural intercourse, levels of rates charged, developmental state of airways and airports, service standards in terms of frequency, adequacy and safety, degree to which conflicting national air transport and non-air transport interest are reconciled and subordinated to the convenience of the international traveler, and efficacy of the overall service pattern which will evolve "through authorization of various routes and service privileges to serve the best interests of international air transportation."

Crozier got down to brass tacks in the transatlantic report, prepared before the Latin American report but released after it. It must be remembered that many changes in the international situation took place between the fall of 1943 when the transatlantic report was completed and June, 1944, when the CAB announced the final route pattern—a more ambitious program was required at the latter date.

The Crozier report envisaged three trunk routes, on which one U.S. carrier for each would be sufficient. These routes are:

1. New York, Botwood, one branch to Horta, Foynes, Amsterdam, Berlin, Prague and Warsaw, the other to Reykjavik, with a subdivision to Oslo, Stockholm, Helsinki, Leningrad and Riga, another to Copenhagen, Hamburg and Berlin. This route would serve Holland, Scandinavia, North Germany, Czechoslovakia, the Eastern Baltic States, Poland and European Russia.

2. New York, Botwood, Horta, Foynes, London, Brussels, Vienna with a branch from there to Budapest, Bucharest, Istanbul, Damascus, Lydda, another to Belgrade, Sofia, Athens, Alexandria. This line would serve Britain, Central Europe and the Near East and appears to be the most profitable operation.

3. New York, Botwood, Horta, with a branch to Foynes, Paris, Geneva, Marseilles, another to Lisbon, Madrid, Barcelona and Rome. This route covers Portugal, Spain, France, southern Germany, Switzerland, and Italy.

For this service pattern, Crozier proposes 60 four-engined planes of 8,800 pounds payload capacity for over-ocean flights and 23 two-engined aircraft of 5,000 pounds payload capacity for intra-European service. They would be utilized at a daily average of 8:08 and 5:56 hours respectively. Route segments would be under 1,500 miles.

These routes were worked out scientifically on the basis of indicated traffic volume between America and European centers. Crozier was coldly economics-minded throughout, paying scant attention to political considerations. He outlined what he thinks are patterns for air operations that will pay off.

To arrive at his conclusions he assembled data covering every aspect of route planning: population figures for every European country and city, national incomes per capita, sea-borne mail dispatched from the United States, ship debarkations from the United States, distribution by countries and classification as to citizenship and residential characteristics of overseas travelers from the United States to the European-Mediterranean area, pre-war European air routes and reciprocal and pooling arrangements, and a multitude of other subjects were studied in great detail.

Crozier's work in hand, the Civil Aeronautics Board now began in earnest to plot the course of future United States air routes, without respect to the carriers which would fly them, a matter for the Board to settle in public hearings under existing law, or to transit and landing rights, a matter in the hands of the State Department. The official word is that harmony prevailed throughout these considerations. The Army and Navy studied the proposed routes intensively from the standpoint of future security and stamped them with approval. The State Department studied them from the standpoint of their practicability in light of foreign attitudes and likewise approved the route proposals.

It was with all this background that President Roosevelt approved the plan. On June 14, 1944, the CAB, in the first press conference it ever held, announced to the world the United States policy on post-war air routes. The Board, required by law to hear applications as soon as possible, could wait no longer on the then remote possibility that Congress would alter that law. Those hearings are now in progress. The map made public that day in June is the one whose routes will be certificated. The CAB had been foresighted enough to request and obtain agreement from the applicant airlines that they would serve whatever routes the Board found them best qualified to serve.

Thus, with the war in Europe drawing to a close, Federal policy deems it essential to get America's air transportation system into high gear. The State Department, meanwhile, is working to obtain the necessary landing rights toward a fully rounded U.S. world air transport system to go into operation at the soonest possible moment. END

When Johnny Comes Flying Home

(*Continued from page 31*)

salaries of first pilots who fly domestically would fall somewhere near the $650-a-month figure. First pilots who fly over-ocean or intercontinentally receive from $200 to $250 per month more. Co-pilots flying domestically receive from $190 a month to as high as $380. For over-ocean or intercontinental assignments they receive around $450 or $500 per month.

There has been much misinformation about pilots' salaries. The highest figures have often been cited rather than averages. Salaries of the co-pilot group, comprising about half of all airline pilots, have always been low. But even so, airline salaries are more attractive than those of many other flying jobs which likewise will be swamped with applications from returning airmen.

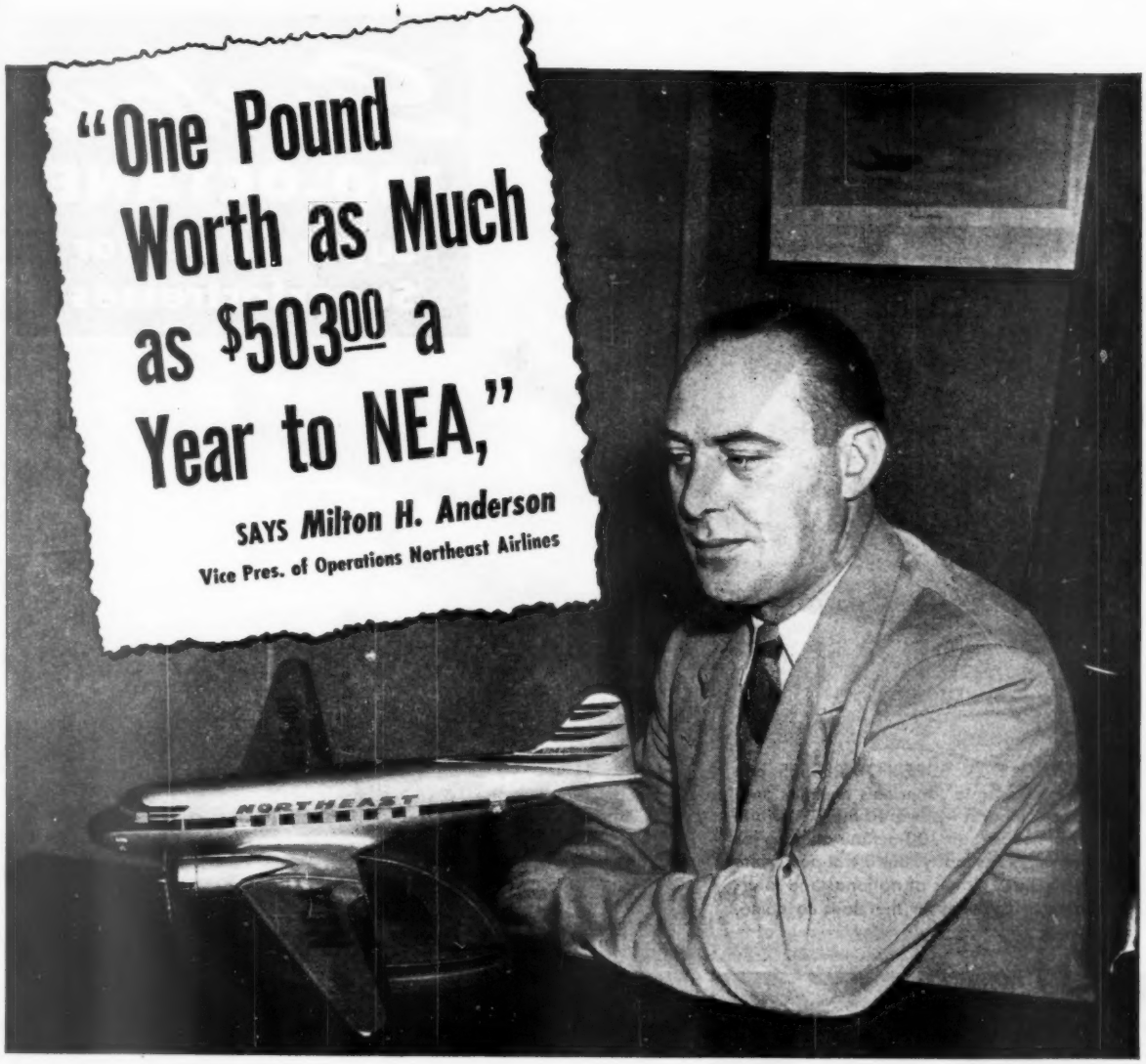
Young's estimate of 100,000 discharged service flyers, when compared with the 4,000 airline positions, or even with his estimated total of 39,000 available flying jobs, adds up to quite a post-war surplus of pilots. Of course, there is no way of knowing how many discharged pilots will elect to return to former civilian pursuits or to enter some other occupation. And, the Army still is silent on the speed and details of demobilization.

There is one field of endeavor, however, which definitely shows promise of taking up the immediate post-war slack—educational benefits for servicemen. Brig. Gen. Frank T. Hines, Administrator of Veterans' Affairs, reported that within three weeks after approval of the so-called G. I. Bill of Rights by President Roosevelt more than 1,000 applications had been made for the educational benefits alone. Great interest also is being shown, Hines disclosed, by men and women still in the armed forces who may not apply until discharged.

Ninety days active service since Sept. 16, 1940, and prior to the termination of the war—with separation effected under conditions other than dishonorable—are a requirement of eligibility for educational benefits. It is true that a veteran must show that his education was interrupted. But this provision should eliminate only a very few members of the air force in view of the general youthfulness of this branch. It is stipulated that veterans who entered the service before they were 25 years of age are deemed to have had their education interrupted for the service eligibility.

Hines' office forsees that the educational program will prove highly attractive to the returning airman who wishes to pursue further training in the technical phases of aviation. The Veterans Administration may pay tuition fees and other incidental costs of training up to $500 a year to an educational institution selected by the veteran and approved by the Veterans Administration. While enrolled in an approved course of training, a subsistence allowance of $50 a month would also be payed to the veteran, if he is without a dependent, and $75 a month if he has a dependent.

(*Continued on page 104*)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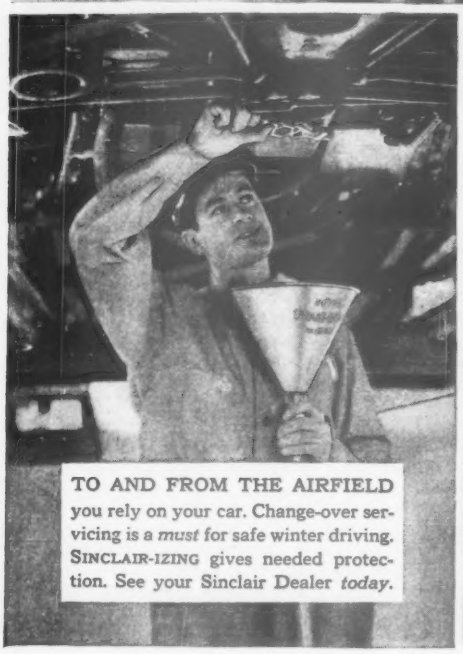
B-29 Superfortress compared to B-17 Flying Fortress.



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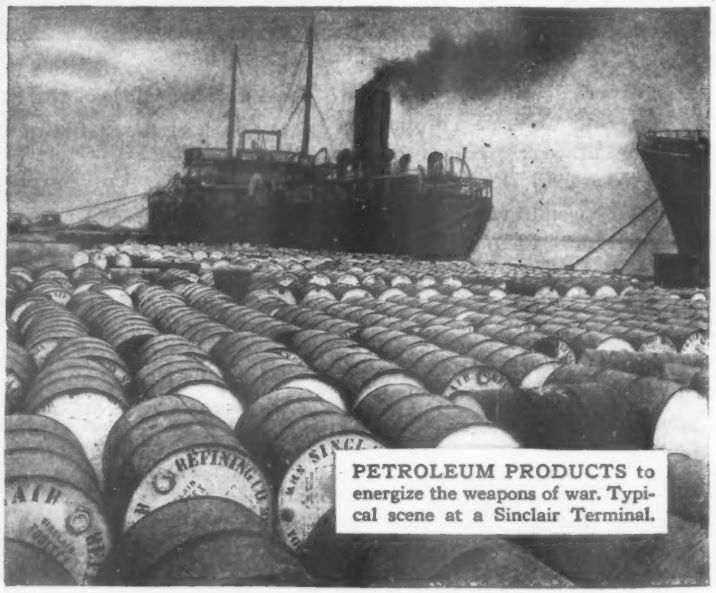
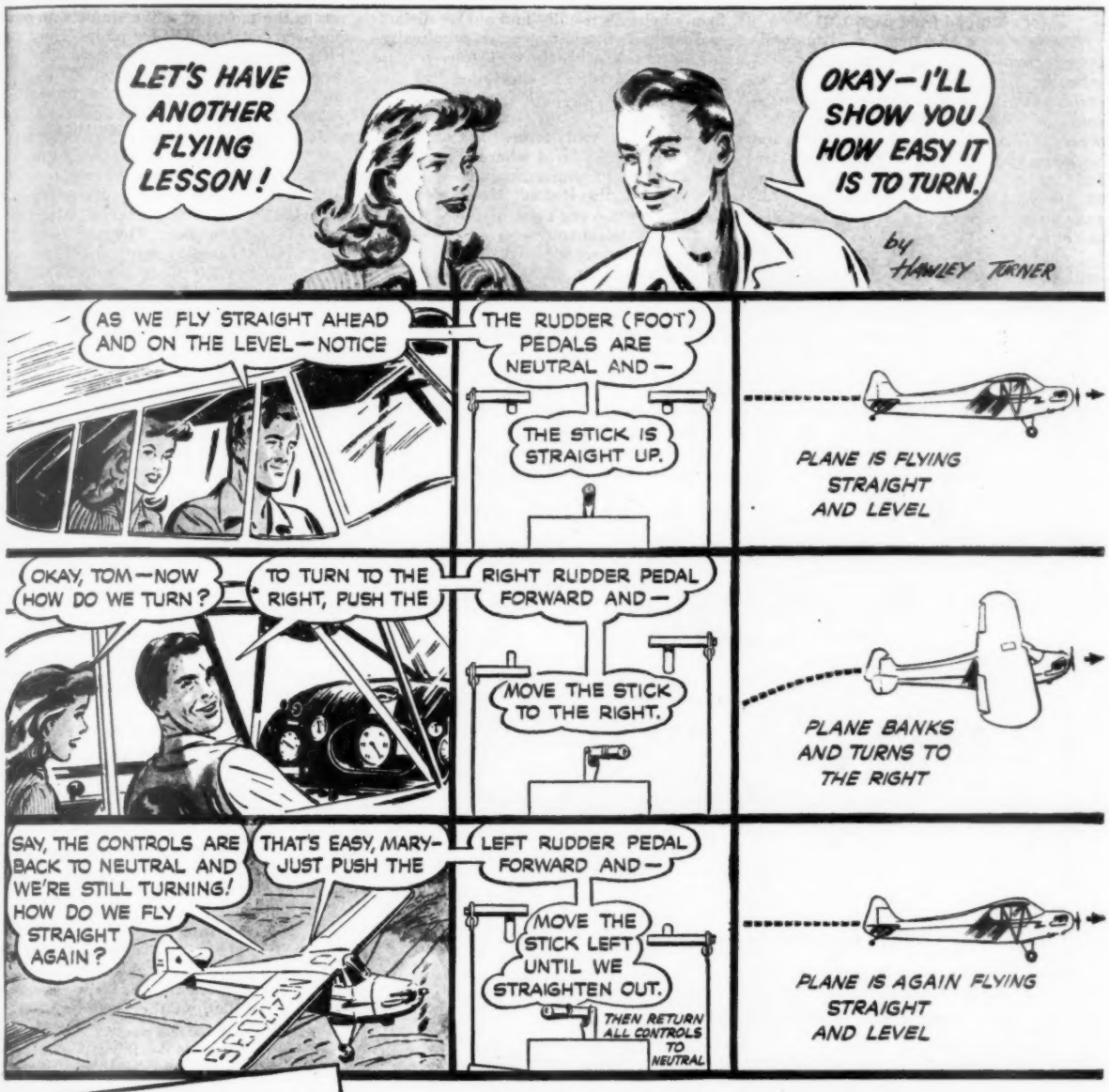


PETROLEUM PRODUCTS to energize the weapons of war. Typical scene at a Sinclair Terminal.


LET'S HAVE ANOTHER FLYING LESSON!
OKAY—I'LL SHOW YOU HOW EASY IT IS TO TURN.
by HAWLEY TURNER
AS WE FLY STRAIGHT AHEAD AND ON THE LEVEL—NOTICE
THE RUDDER (FOOT) PEDALS ARE NEUTRAL AND—
THE STICK IS STRAIGHT UP.
PLANE IS FLYING STRAIGHT AND LEVEL
OKAY, TOM—NOW HOW DO WE TURN?
TO TURN TO THE RIGHT, PUSH THE
RIGHT RUDDER PEDAL FORWARD AND—
MOVE THE STICK TO THE RIGHT.
PLANE BANKS AND TURNS TO THE RIGHT
SAY, THE CONTROLS ARE BACK TO NEUTRAL AND WE'RE STILL TURNING! HOW DO WE FLY STRAIGHT AGAIN?
THAT'S EASY, MARY—JUST PUSH THE
LEFT RUDDER PEDAL FORWARD AND—
MOVE THE STICK LEFT UNTIL WE STRAIGHTEN OUT.
THEN RETURN ALL CONTROLS TO NEUTRAL
PLANE IS AGAIN FLYING STRAIGHT AND LEVEL

GET YOUR "HOW TO FLY" BOOKLET

New booklet, "How to Fly a Piper Cub," covers the fundamentals of flying with over 50 step-by-step photos and descriptions. Many other facts, full-color pictures of Piper Cubs. Send 10c in stamps or coin for postage-handling. Write Piper Aircraft Corporation, Dept. PA124, Lock Haven, Penna.

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PIPER "PLANE QUIZ"

1. Which is simpler, the engine in your car or in a Piper Cub?
   The engine in the Cub is much simpler.
2. What is the upkeep and depreciation on a Piper Cub?
   Considerably less than that on a popular-priced car.
3. Who can learn to fly a Piper Cub?
   Anyone 16 to 60 with normal health and judgment.
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This lesson explains only the fundamentals. Keep it with the others that follow. See your Piper Cub dealer for actual flying instructions. Write us "Plane Quiz" questions you want answered.

PIPER AIRCRAFT CORPORATION—LOCK HAVEN, PENNA.

PIPER CUB

Points the Way to Wings for ALL Americans

(*Continued from page* 100)

"For temporary purposes and immediate approval of education or training, all schools and institutions of recognized standing will be accepted," the general said. "Procedures are being developed with the War and Navy Departments and with the approved educational and training institutions and the Veterans' Administration regional offices so that a veteran may enter training with the least possible delay."

In industrial circles, as well as in Government offices, there is much planning for the future already under way. Activities of the Civil Aeronautics Administration are directed toward encouraging and fostering "the development of civil aeronautics and air commerce" as described in the Civil Aeronautics Act of 1938. The happiest condition which CAA can envision is one in which the general public will take up private flying. CAA firmly believes it will—and not far distant.

Charles I. Stanton, former administrator of the CAA, anticipates 300,000 private planes within three years after the war. CAA, which built $400,000,000 worth of airports for the Army and Navy and assisted the armed forces at 204 spots throughout the world where airway aids were needed for American planes, also estimates that the United States will need 6,000 airports very soon after the war—double its present number. It even lends a willing ear to the proponents of programs involving 25,000 landing places throughout the country.

It is difficult, if not impossible, however, to translate CAA's outline of so vast an increase in private flying into terms of post-war jobs for pilots—into commercial expansion of the aviation industry in terms of employment.

The airlines, anticipating an expansion in both domestic and foreign routes, stand out as the most attractive single source of post-war employment for pilots. They can be expected to attract the cream of the demobilized military flyers. Their requirements are by no means unlimited, however.

John Groves, director of operations for the Air Transport Association, estimates that the nation's airlines, which were operating 350 planes prior to Pearl Harbor, will be flying 1,000 planes within three years after the war. The airlines' pre-Pearl Harbor employment consisted of approximately 1,500 pilots and 1,600 to 1,800 co-pilots. Thus, the operation of 1,000 airline carriers, assuming the use of many larger craft than the pre-war DC-3's, may require 10,000 pilots. Young's estimate of 4,000 was based on the operation of 500 planes by the airlines within two years after the war.

Pointing to the many applications for new foreign and domestic routes already filed with the CAB, Groves declared:

"The air transport industry is going to move ahead. There definitely will be no cutback. We are one branch of the aviation industry that is going to need more personnel. But we should have no problem in securing trained and competent flyers."

The airlines, Groves said, will employ many of the crack pilots of World War II. He emphasized, however, that none of them will step out of the cockpit of a *Fortress* into the left seat of an airliner. No matter how skilled a pilot he was over France, the demobilized military ace must be adapted slowly to the ways of the airlines—and that means more training. The returning air force flyers will see their first service on the airlines only as co-pilots, learning thoroughly the prescribed transport procedures which have given United States airlines their fine record of performance.

Groves' warning has been seconded by John Dickerman, assistant chief of the AFL Air Line Pilots Association, which has some 3,000 members now in service on the airlines and another 2,000 in uniform.

"The difference between a *Thunderbolt* and an airliner is as the difference between night and day," Dickerman said. "The skills which make a good fighter pilot don't work for an airline pilot. The training of the military flyers will be invaluable, but they'll have to 'unlearn' a lot and re-learn safe procedures. The heavy-bombardment men should be particularly valuable to us, however."

The returning military ace, before being entrusted with an airliner full of passengers, will need to master the approach and let-down procedures of the domestic carriers, the operating rates of ascent and descent, turns and air traffic rules and regulations. He will have to learn to maintain certain altitudes, the system of radio contacts and navigation.

"You just don't fly from New York to Chicago any damn way you please," Dickerman warned.

The union leader refused to hazard a guess on how many military flyers would be able to find post-war jobs with the airlines, except for a non-committal "there'll be room for the best." He pointed out

THE JET—U. S. and British Versions

Contrasting view of the Airacomet (foreground) and the Kingcobra, both planes built by Bell. The Airacomet is the first jet-propelled U. S. fighter and the Kingcobra succeeds the Airacobra.

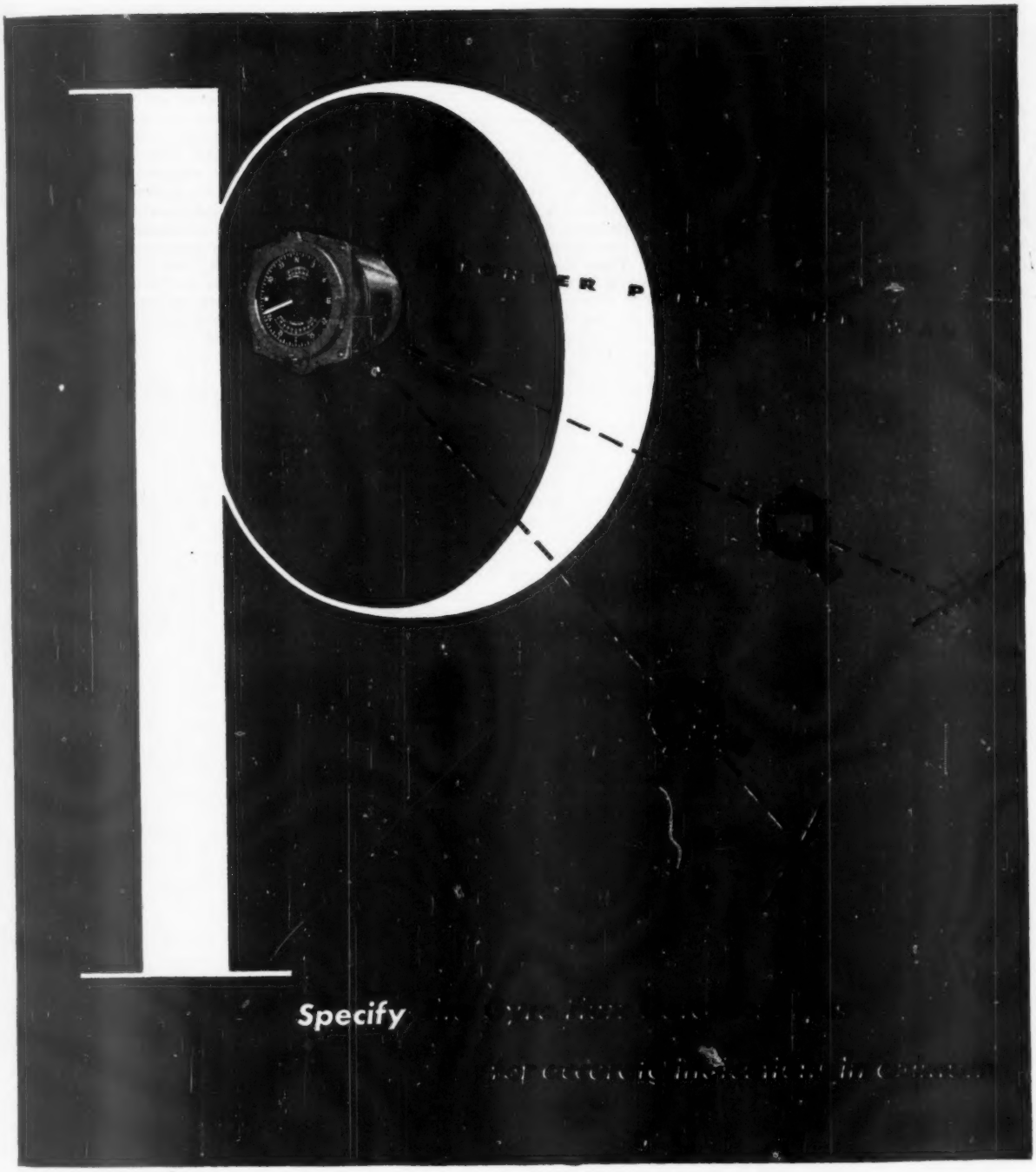
The British Gloster, successfully used against robot bombs, according to RAF.

Three-quarter view of Airacomet shows upswept tail and nozzles of the jet engines.

Head-on view of Airacomet showing air intakes of engines closely hugging fuselage.

THE Army's new jet-propelled *Airacomet* differs markedly in appearance from its British counterpart, the Gloster. Photographs of both planes shown here emphasize the differences. The Gloster, which has been used successfully against robot bombs, has a single jet engine within the fuselage, while the *Airacomet* has two jet engines hugging the fuselage on the inboard edge of the wide wing.

The *Airacomet* closely resembles any mid-wing fighter except that it has no propellers. The fuselage is slender, the empennage conventional and the wing laminar-flow, flat and tapered. The plane weighs more than 10,000 pounds, has a wing span of 49 feet, and now carries four .50-caliber machine guns. Its rated speed is "over 400 m.p.h." It flies so smoothly that a vibrator is installed on the instrument panel to keep the delicate needles functioning properly by eliminating stickiness.



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INVEST IN VICTORY — BUY BONDS

that there will be many old airline pilots among the demobilized veterans who will be entitled to their old jobs and seniority rating. Others, he said, will have to learn the business and "come up" in the regular way.

"The post-war adjustment period will be terrific," he added. "It will involve not only pilots, but also navigators, bombardiers and the maintenance crews. The mechanics, by reason of their skills, should be able to find jobs in other lines, although many will be needed in aviation. Radio men also can find other commercial jobs. There seems to be little room for the navigators."

Both Groves and Dickerman warned that the increase in air transport operations will be slow and steady as the traffic warrants. There will be no "willy-nilly" expansion of routes at the present $100-an-hour cost of operating an airliner.

Dickerman foresaw a greater growth in non-scheduled flying but cautioned, as did Young, against over-optimistic expectations as to this phase of aviation's immediate post-war future.

"I can't see private flying except in the category of yachting—sort of a rich man's sport—until some of the technical problems are licked," the AFL official commented. "The helicopter may offer some solution to the question of accessible airports. However, there are other obstacles such as navigation and the weather, which operate against an immediate expansion sufficient to take up a great number of returning pilots."

Dickerman advanced the general observation that the cream of the crop of military flyers, those willing to make enough sacrifices to stick to it, will be able to find some position in America's post-war aviation picture. Those who make the grade on the airlines will find themselves in the No. 1 civilian flying jobs, assured of many years of service—as long, in fact, as they are physically fit. Some airline pilots today are past the 60-year age marker. Such flying will be a far cry for the military pilot from the momentary "blackouts" experienced in a diving pursuit ship. It will call for 80 hours of straight and level flying a month with nobody shooting at you.

CAA officials are well aware of the fact that the "conversion" of military pilots will require careful handling. Regulations already are on the books aimed at easing and facilitating the return of war pilots to civilian flying life while still maintaining safe operations practices. The regulations were born out of the unfortunate accidents which have resulted when private plane owners, eager to welcome back the hometown fighter pilot, have urged him to fly their planes. Both owner and guest pilot are prone to disregard the special ability required to handle the slower and lower-powered civilian craft.

If a pilot has not flown the type of plane concerned within the space of three months, CAA regulations require that he make five take-offs and landings before taking up a passenger. If he has not had solo experience within the past six months, he is required to take a check flight with an instructor. Observance of these regulations, officials believe, will prevent many accidents.

Concern of the industry that returned fighter pilots might step into cockpits of commercial planes and start flying passengers merely on the strength of their war flying is met by strict requirements of the Civil Air Regulations proposed under section 20.129 headed "Military Competence." This section requires the flyer to prove that his military pilot rating is at present equivalent to the type and grade of pilot certificate sought; that he pass a written examination on the Civil Air Regulations; and that he prove he has been honorably discharged and submit a certificate from an appropriate officer proving his experience and competency as a military pilot.

It also is anticipated that the returning "ace" will have to meet CAA's requirements on instrument flying before being allowed to take over the controls of an airliner. According to present plans, the so-called Army instrument "ticket" will be acceptable in CAA's eyes only for the position of co-pilot.

Airlines will have their own additional requirements to add to this list. A summary survey indicates that co-pilots must be between the ages of 22 and 32 years, and that preference will be given to men who are not over 28 years of age. They must have at least a high school education, although some college and university training is greatly desired. Most companies have their own rigid physical examinations as well as various other pre-employment requirements.

One airline reports that most of its new pilot employees are men who were instructors in the CAA War Training Service schools. They have had an average of from 1,000 to 2,500 hours of flying experience. Even so, they are given from 60 to 110 days of intensive training in the airline's own school before they are accepted as co-pilots. About 12 are graduated from the school each month.

In most instances, captains are promoted from the ranks of an airline's first officers. The average requirement is two years of experience with the company as a probationary period before such promotion is made.

Despite all this gloomy prognostication, there remains one gleam of hope for the returning pilot. Just as the automobile industry gave work to thousands after the last war, so an under-rated public interest in air transportion may provide thousands of jobs after this war that conservative estimates do not foresee. It all depends on how great that interest is and on how rapidly commercial air transportation companies are allowed to expand to meet it.

END

Forecasts Lower Rates

A DECLINE in post-war air rates is forecast by Dr. D. H. Davenport of Curtiss-Wright Corporation's Airplane Division, Buffalo. Dr. Davenport believes that within five years after the war, domestic passenger rates will fall from the pre-war average of 5.1 cents per mile to 3.5 cents per mile, and express rates from 80 cents per ton-mile to 30 cents.

THAT OUR COUNTRY MIGHT *Out-Design* THE ENEMY

Here, behind RESTRICTED AREA signs, Curtiss-Wright is constantly developing new designs and modifying current models. This is the major precept of the builders of military aircraft . . . . perpetual, unrelenting progress!

While this endless research and experimentation centers on increasing the military performance of Curtiss planes, it has a constructive side too. Many of these war-born advancements will have a peacetime application, when an airminded world takes to the skies!

Look To The Sky, America!

Curtiss-Wright Corporation, Airplane Division, Buffalo, N. Y.

Another Contribution of

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Toward Winning This War

Member Aircraft War Production Council East Coast, Inc.

U. S. Navy's Grumman Hellcats Poised for Action

Grumman

AIRCRAFT ENGINEERING CORPORATION, Bethpage, L. I., N. Y.

Beverly Howard

(*Continued from page 23*)

cently-completed survey made by John Geisse for the Civil Aeronautics Administration in which Geisse found that of 100 pre-war civilians who took out student permits, only 15 got private licenses. Furthermore, the average length of ownership of a plane by a private flyer was found to be only 3.44 years. In other words, there was a great interest in flying and plane ownership, but it was not sustained. Howard believes that the chief reason for this was the independent spirit of fixed-base operators and the almost complete lack of service for pilots and their planes, native or transient.

Howard proposes a program designed to anticipate rather than merely to meet pilot needs—plus service with a smile. He is already negotiating for a score of fixed bases scattered down the eastern seaboard in Virginia, North and South Carolina, Florida and Georgia.

Unlike most post-war programs, this one has gone beyond the talk stage. Howard already has a contract to renew his pre-war operation at Charleston, S. C., municipal airport as soon as military restrictions permit. He has, in addition to his war-time Army primary training program at a Government-owned base at Orangeburg, S. C., a private flying operation at Orangeburg's Jennings Municipal Airport. An indication of how things are going at this field—where Howard has been guinea-pigging his post-war policies—is that the number of private planes has doubled since he took over more than a year ago. With 21 private craft at the field, Howard believes that it has more planes per capita (Orangeburg has a population of 10,000) than any other field in the country. Service is the watchword, and the field is kept in spotless order—another Howard fetish.

Similar operations have recently been started at Rocky Mount, N. C., Greensboro-High Point, N. C., and (for sightseeing and charter service only) at the Washington (D.C.) National Airport. This latter project, however, awaits lifting of the Army east coast ban on private flying before it can go into operation.

These activities augment a large Hawthorne operation at Columbia, S. C., which sprung in 1938 from the original Charleston base. Located on Columbia's municipal airport, Hawthorne has conducted CPT and WTS-Navy V-5 programs as well as commercial operations.

An indication of how service will be featured in the fixed-base program is that the Howard organization is already at work on a complete manual listing what a linesman and other service personnel shall do for arriving pilots. The linesman is pictured as one of the most important workers at the field. He will meet all planes, local and transient, flagging them in, determining their needs. Weather reports will be delivered to the cockpit. Gasoline and oil sales, repairs, hangar storage or tie down service will be part of the routine. There will be comfortable seats for pilots and visitors on airport administration balconies and other facilities will be carefully policed for cleanliness and serviceability.

Besides shops at all fields, there will be a major overhaul shop near the geographic center of Howard operations where complete repair and overhaul jobs can be done. A central purchasing organization has already been set up to develop a full line of supplies for pilots and planes, with wholesale ordering to reduce consumer cost to a minimum.

In addition to these services will be plane rentals and sales. Howard plans call for planes ranging in price from $1,000 to $50,000. He bases this on many years' experience selling Piper Cubs in the South and on a recent survey of what plane builders are planning post-war in the Piper class and in heavier planes, such as Beechcrafts, Stinsons or Wacos. He says confidently that he will have eight to 10 models, four of them as yet unseen in civilian circles. The new ones will be a single-engined two-place job cruising at 130-140 m.p.h., $3,000; a four-place, single-engined, 140-150 m.p.h., $4,000; and a twin-engined, five-place, cruising at 160-170 m.p.h., and selling for less than $10,000. There will also be a choice of two models in the putt-putt field and a light amphibian. In the big-money field he already has seen two models which will be added to the line—a five-place, single-engined craft, cruising at around 200 m.p.h., in the $10,000-$20,000 class, and a twin-engined, 10-placer cruising at about 220, for somewhere in the neighborhood of $50,000.

Whether any of the models will be spin- and stall-proof or

A YANKEE DOODLE dandy

Making as famous a name for itself as its predecessor—the Yankee Doodle! Sleek, rugged—thrilling, easy to fly. Performance to meet the most exacting demands of critically enthusiastic glider pilots . . . Actually, it's tomorrow's glider, flying today. Ready for you when "civies" are the rule, not the exception . . . For WINGS OF THE FUTURE look to Laister-Kauffmann.

Over all span: 50'
Over all length: 21½'
Over all height: 4' 7½"
Weight empty: 475 lbs.
Gross weight: 875 lbs.
Minimum landing roll: 100' (approx.)
Stalling speed: 37.4 m.p.h.
Top design speed: 140 m.p.h.
Placard speed: 126 m. p. h.
Wing loading: 5.27 lbs. per sq. ft.
Maximum gliding ratio: 23 to 1
Aspect ratio: 15.06
Minimum sinking speed: 3.2' per second

Wings for the Future
Laister-Kauffmann
Aircraft Corporation
ST. LOUIS (17) MISSOURI

have other safety factors will, he says, "be up to the manufacturer and what the public demands."

"It is reasonable to expect every new model to have some improvements each year, as is the case with the automobile," he points out. "Public demand will push the aviation industry toward constant improvements, and spin-and-stall prevention will undoubtedly be among the first."

On the question of customers, Howard is not pessimistic. He makes the point that aviation survived for years on the petty cash from the pockets of amateurs definitely in the lower brackets financially but high in enthusiasm. "If they had been given half a break," he asserts, they would have stayed in flying in spite of limited funds." Howard—and there are scores of others like him in Dixie—proposes to give post-war amateurs that break. In addition he is determined to reform fixed-base habits so that the Main Streeter with cash to spend will spend at least some of it in aviation. Instead of following the traditional sit-at-the-airport-and-to-hell-with-the-customer-unless-he-comes-to-you attitude, an important aspect of his program will be to sell the airplane as intensively as the automobile has been sold. Salesmen and Howard executives will be expected to become a part of the commercial and social community in which they work. They will have publicitv.

Howard estimates that his activities will embrace a population area of some 10,000,000 persons, of whom he estimates that 25,000 will buy an airplane of one sort or another in the first five years after the war. He does not have any illusions about getting all of those customers—stiff competition is already in the field. But his share of it will not, he points out, be hay.

How much business all this is going to add up to is, of course, anybody's guess, but again Howard is not pessimistic. Here's the way he has it figured out:

"On a basis of 1943 at 100 per cent—and that was our peak war-training year—we will gross some 80 per cent during the current year. Similarly, where we had 500 employees last year, this year we will average closer to 400.

"The immediate post-war slump will, of course, be inevitable, but I believe that the slump will be due to readjustment problems rather than to a fundamental economic set-back. We'll have to cut down all around to meet it, but the rebound will be quickly evident. Within five years we anticipate that our gross will be back to 100 per cent as compared to 1943 and will mount steadily thereafter."

Is Hawthorne relying heavily on post-war Army training or a revival of the Civil Aeronautics Administration's CPT? The answer is: "No. Such programs would be helpful especially during the readjustment periods," Howard explains, "and we are anxious, willing, and ready to continue our Army primary and to resume any CAA training, but to count on them would be economically unsound."

Howard and his associates are also skeptical of training in schools below the college level. They anticipate a not inconsiderable business from colleges and universities in the vicinity of their operations. These include the University of South Carolina, University of North Carolina Women's College, Guilford College, Greensboro College, Oakridge Military Institute, The Citadel, and the College of Charleston.

How about a feeder-pick-up service? Hawthorne has filed an application with the Civil Aeronautics Board for such a service running as far north as Staunton, Va., and including Richmond, Norfolk, Rocky Mount, Greensboro, Charlotte, Spartanburg and Columbia. Over three years of intensive research have already been spent in developing six routes to serve 167 points most efficiently. Such a service can be synchronized with fixed-base operations if a franchise is granted.

And how about competition?

The Howard organizations are frankly expecting a lot of it. It has already shown up in signing some of the fixed-based contracts now on the books and conceivably will become more intense as post-war aviation advances in the south. It consists of two principal groups—local aviation operators in any given town, and multi-town operators like Howard. Both varieties are cropping up all over the South, both in and out of Howard's potential area.

Embry-Riddle, with one of the outstanding war training records, has expansive plans for fanning out from its home base in Miami. Cody Laird of South-eastern Air Services, Inc., is a growing competitive figure in Georgia, where he was recently made chairman of the Aeronautical Advisory Commission. In Tennessee, under the leadership of the State Aeronautics Commission, half a dozen fixed-base operators are going ahead with post-war plans.

But Howard is not worried about competitors and [illegible] doesn't think they are particularly worried about him.

"There's going to be plenty of business for anybody who can do a good, workmanlike job for aviators," he says. "If a majority of the fixed-base operators do that job, post-war flying will prosper.

"After surveying activities and potential activities throughout the eastern United States, I think that there are plenty of operators ready to do this job. If public reaction to flying during the past few years is any indication, I should judge there will be an equal abundance of customers. Bring the two together and add plenty of hard work and we should have a business notable for its stability and outstanding in its service to society." END

Oliver Parks

(*Continued from page 22*)

lot of people learned to fly without too much difficulty—but that it was too inconvenient, involved too much unpleasant travel and was too exclusive.

To offset this we must substitute for the airport the "airpark" and literally bring it into the back yard of the average citizen. We have already surveyed this problem in the St. Louis, Indianapolis and Kansas City areas and found that it can be solved. Airparks can be built without excessive cost conveniently close to lower-cost residential districts, in the heart of town, as well as in high-cost residential areas. Downtown parks can be combined with existing rail installations. Elevated landing decks can be used. With such parks, the airplane can rank with the automobile in taking you where you want to go without unnecessary inconvenience in using other forms of transportation.

The St. Louis Municipal Airport Commission already has before it complete plans of suggested sites for 24 of these airparks to be laid down in various parts of the city. Mayor Aloys P. Kaufmann of St. Louis has called for an "inspired airport program" as part of the $60,000,000 post-war improvement plan to be financed in part by funds from a $36,000,000 bond issue proposal which was voted at the August 1 primary election. A $10,000,000 allocation for airports is planned.

The city has retained a staff of consulting engineers who have already begun consideration of the Parks plan. General approval of the plan also has been given by J. Gates Williams, Chairman of the Chamber of Commerce Air Board, and Tom E. Flaherty, former regional supervisor of airports for the CAA, now an assistant in aviation to Milton M. Kinsey, president of the Board of Public Service and chairman of the Airport Commission.

The program would give the St. Louis metropolitan area three major airports and a correlated group of airparks for private flyers.

To provide the services that will be required by the U. S. post-war flying public, our research shows that nationally, some 6,000 such airparks will be needed. The necessary program of constructing them will provide, among other things, temporary jobs totaling 1,000,000 man-years, plus nearly 500,000 permanent jobs. This is based on the premise that there will be 5,000,000 private planes built and sold by 1960.

How do we justify the expenditure of the $1,500,000,000 that such a construction program would require? Most of our Congressmen believe we will have somewhere between 12,000,000 and 15,000,000 unemployed immediately following the war. Congress, very likely, will appropriate substantial Federal funds for construction projects—super highway systems, flood control, public parks and buildings. We have worked very closely with Congress and with the Secretary of Commerce in promoting the idea that out of such public expenditure should come the 6,000 airparks that private aviation must have.

There should be no more question about the justification of such expenditure than there has been concerning the $800,000,000 we have already spent for commercial airports throughout the United States.

(*Continued on page 114*)

Mark of *Dependability*
Shield of *Protection*

Breeze Radio Ignition Shielding Guards Radio Communications Against Natural and Man-made Interference

The Breeze Mark on Radio Ignition Shielding has for sixteen years been a mark of dependability, symbolizing the quality workmanship and engineering skill that has gone into every Breeze Shielding Harness. Designed for use on hundreds of different types of engines, this shielding has been developed by Breeze engineers to eliminate the radiation or absorption of high frequency interference in radio communications. In addition to this important function, durable protection is afforded to secondary wiring systems by Breeze Flexible Shielding Conduit, which guards against moisture, corrosion and abrasion.

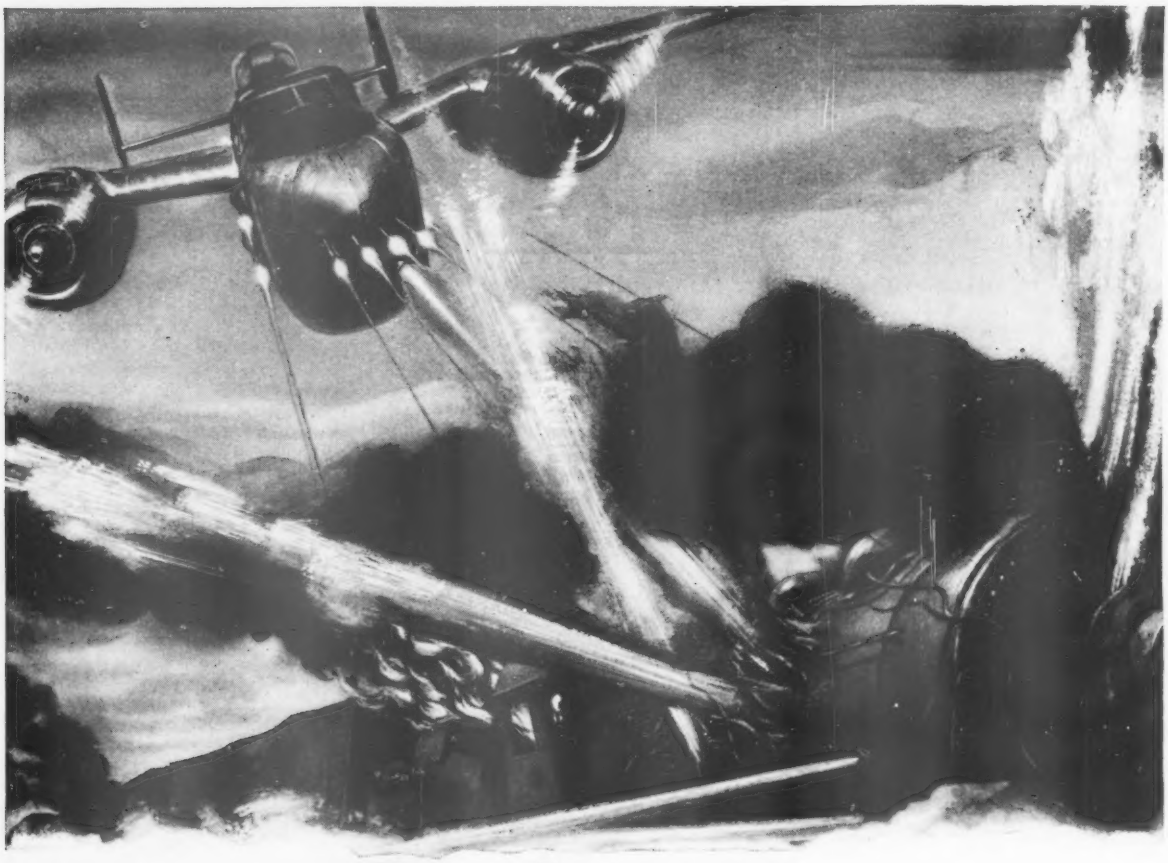
Now in service aboard aircraft, ships and tanks of Allied Liberation forces, this equipment is the result of years of Breeze experience in the field. With its unequalled background of research and production, Breeze has acquired the knowledge and ability required to solve any shielding problem.

Breeze BREEZE MARK
CORPORATIONS, INC. NEWARK, N. J.

PRODUCTION FOR VICTORY • PRODUCTS FOR PEACE

A Few of the Many Breeze Products in the Nation's Service

Radio Ignition and Auxiliary Shielding
Multiple Circuit Electrical Connectors
Flexible Shielding Conduit and Fittings
Cartridge Engine Starters
Internal Tie Rods
Elevator and Rudder Tab Controls
Flexible Shaft and Case Assemblies
Aircraft Armor Plate



Train Dispatcher

WHAT HAPPENS when a Jap locomotive takes a "75" cannon shell from a North American B-25 Mitchell? Here is a brief description of "train dispatching" by American pilots direct from a combat report: "The locomotive hesitates, seems to squat a bit, jumps about four feet, then takes off in all directions at once." As one American pilot put it: "That Jap locomotive is simply out of this world." When the B-25 Mitchell starts ranging a combat area, it's versatility with a vengeance. For whether it's pattern or pinpoint bombing, pillbox strafing, or bridge busting, the B-25 takes them all in stride.

BONDS bought these planes.
WASTE FATS helped arm them.
WASTE PAPER helped ship them.
GASOLINE flies them.
WILL YOU help deliver the next squadron?

FLYING ARTILLERY—loaded by the navigator, fired by the pilot, this 75 mm cannon ads terrific fire power to the B-25 Mitchell.

North American Aviation *Sets the Pace*

PLANES THAT MAKE HEADLINES... *the P-51 Mustang fighter (A-36 fighter-bomber), B-25 and PBJ Mitchell bomber, AT-6 and SNJ Texan combat trainer, and the B-24 Liberator bomber North American Aviation, Inc. Member, Aircraft War Production Council, Inc.*

Until perpetual motion is here . . .

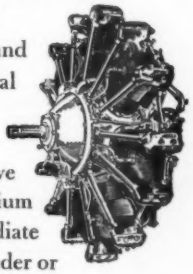
BUY MORE WAR BONDS!

"Until perpetual motion is here, gimme the Jacobs," says T/Sgt. Jinks. "I tended tea-kettles in this man's Army when they thought the JN-4 was a hot plane. I remember jobs that needed two hours in the shop for every one in the air. An' I'm here to tell you that this baby has fewer headaches and less hard work in it than any plane engine I ever met! You grease monkeys get a break because this outfit has Jacobs, and I want you to treat 'em right respectful—see?"

Technical Sergeant Jinks has almost as many hash marks as stripes and rockers on his sleeve. And when it comes to rating aircraft engines, his opinion is as good as they come.

Ground crews in training squadrons are powerfully partisan to the Jacobs. Three years ago, regulations specified 350 flight hours as the maximum service period between major overhauls. That period has been gradually extended to 1200 flight hours! And the Jacobs rarely leaves its nacelle between majors.

YET these Jacobs in the twin-engine trainers that school the bomber pilots, are handled by students, make more take-offs, spend more time at full throttle than any engine in combat service—or commercial operation!



This record of the Jacobs will stand the closest scrutiny of any commercial operation for low maintenance cost and dependable performance . . . After the war, Jacobs will also have new models for light planes and medium transports . . . well worth the immediate attention of plane manufacturers, feeder or freight line operators, private fliers . . . Jacobs Aircraft Engine Co., Pottstown, Pa.

JACOBS • **Pottstown, Pa.**

(*Continued from page* 110)

Most everyone knows that there were only 365 commercial airliners in operation before the war, while there were something like 25,000 licensed private aircraft. Yet the public has not jumped up in arms over the fact that airlines have derived the greatest benefit of our airport construction to date, even though they have paid only a very small amount of money for their use.

The important thing is that the public —even the non-flying public—will derive direct benefit from the airparks project. Airparks will be more than mere landing fields; they will actually be places of amusement and recreation for the general public. They will have tennis courts, baseball diamonds, handball courts and other facilities. They will help meet the fairly constant public demand for more recreation spots. What's more important, they will open up a vast new industry for America.

The program will perform an additional service to aviation and the public. It will take flying where it should have been years ago—into the heart of the community. An airpark will not be designed to serve the airplane only. It will be designed to serve the public that flies planes—to give them the facilities which they require for air travel, plus a pleasant and entertaining center from which they can enjoy them. There will be no necessity for a pilot to walk a mile for a meal—restaurants and similar facilities will be part of the airpark from which he takes off. There will be no need for him to travel great distances when he lands at some outlying airpark for a weekend of fishing or sports. Both will be part and parcel of the park at which he sits down.

And he is going to be around in increasingly big numbers when peace returns, if for no other reason than that he will be learning—if he has not already learned—that flying is safe, inexpensive and easy-to-learn. This the Parks organization has already proved beyond doubt in a flight-training experiment recently completed.

The test was conducted at five points—Parks Air College, East St. Louis, Ill.; Alabama Institute of Aeronautics, Tuscaloosa, Ala.; Missouri Institute of Aeronautics, Sikeston, Mo.; Mississippi Institute of Aeronautics, Jackson, Miss.; and the Cape Institute of Aeronautics at Cape Girardeau, Mo. Students were not flying "material" in the old, superman sense of the word. They were just folks—kitchen help, guards, stenographers, field personnel, women as well as men. Results showed that anybody can fly an Ercoupe with an average of five hours' instruction. Age is no great handicap—for 109 persons between 20 to 60 whom we instructed the time required before solo by age groups was:

20 to 25 years—4 hrs. 18 min.
25 to 30 years—4 hrs. 44 min.
30 to 35 years—4 hrs. 58 min.
35 to 40 years—4 hrs. 59 min.
40 to 50 years—5 hrs. 3 min.
50 to 60 years—6 hrs. 30 min.

Women were only a little less rapid in learning to solo than men.

Records were also kept on direct operating costs during the tests. Including instruction, demonstration and cross-country flying, the score was:

Hours flown, 1,133.
Gasoline, 4,916 gallons @ .21.
Oil, 214 quarts @ .30.
Material used for maintenance, $243.41.
Labor required ($1,117.00), 558.50 hr. at $2.00 per hour.

COST PER HOUR

Gasoline	$ .91
Oil	.056
Material	.21
Labor	.98
Total cost per hour	$2.156
Cost per mile	.02

And all this says nothing about the improved safety factors—far beyond anything current dual-control planes now boast—that will come after the war.

Wishful thinking—the kind of thinking that assumes that Mr. and Mrs. Joe Citizen are going to clamor for the privilege of flying—must be anticipated and stamped out. The clamoring is going to be all on the other side of the fence and the sooner aviation realizes it the better. Peacetime manufacturers, business men and salesmen are already working overtime on ideas to intrigue Joe's post-war mind and interest him in investing his post-war dollars. Salesmen for refrigeration, vacuum cleaners, radios, houses, automobiles—to name only a few—are preparing to go after the post-war market with intensive campaigns. Scores of them are already hinting to Joe and Mrs. Joe how they can most pleasantly spend their wartime earnings. Scores of others are going to be visiting Joe at his office and Mrs. Joe at home. None that I have heard of plan to sit on their fixed bases and wait for Joe to come and see them. And if aviation continues the pre-war, come-and-get-it attitude, aviation—not Joe—is going to suffer. We must go after him with the most intensive, streamlined, ultra-modern sales program in the nation's history.

I don't mean to imply that this is a new and revolutionary idea or that the Parks organization is going to carry it on in a new and revolutionary way. It's just horse sense based on the sales history of any successful American product, from whale oil to the automobile.

Specific ideas should turn up by the dozen once we have decided on our premise—that the public must be reached and sold if we are to succeed. Another premise also based on horse sense, is that salesmanship must pay off. Behind it must be a sound economic structure and a sound product that the public will want and can use. American aviation genius has already come up with a number of salable airplanes, and there will be scores more after peace comes. There will also be scores of sales ideas popping up all over the place if we in the industry really put our minds to it.

One thing is certain; in the post-war period it is going to be impossible to make people fly, no matter how great their interest in aviation, until we in the industry see to it that flying is made convenient, pleasant and useful. And the sooner we attack the job cut out for us, the better for all concerned.

If there is going to be a revolution in private flying—and I, for one, sincerely believe that there is—the aviation industry and the fixed base operator should seize the responsibility for starting it and start it now. END

Front Line Airstrips

(*Continued from page* 58)

carpenters and bricklayers, are prepared to lay aside their construction tools and take over as machine gunners, cannoneers and riflemen.

Some of the new units are airborne. All are highly mobile so that as rapidly as one airfield is completed they can move to a new site and begin another. Their mission keeps them constantly on the move, bulldozing a trail of airdromes across the battle fronts. They are geared to fast action, whether the task calls for the leveling off of bomb craters or carving out a suitable land area in woodlands. Construction units are equipped with powerful lights and will do long, unbroken hours of labor without a letup to complete an airfield in a crucial sector.

The first units of the aviation engineers to advance into newly captured territory are mobile reconnaissance crews. These are small parties which include radio operators, surveyors, engineers, technicians and gunners. Traveling in jeeps and armed half-tracks, their job is to visit sites which have been tentatively selected from advance intelligence data and photographs and to report their current suitability for airdrome development. If their reports are favorable, stripped-down companies of aviation engineers move in and begin work. They are followed by the heavier construction elements of the battalions.

Bulldozers are the key implements of the engineers. Other vital equipment includes carryall scrapers weighing as much as 10 tons each; 6,000-pound sheepsfoot rollers for compacting earth; wobble-wheel rollers; several types of scoops and clams; power shovels; tractors; concrete mixers; half-tracks; prime movers and trailers; ditching machines; graders; earth augers; machine shops; trailers, jeeps and command cars; radio equipment; and a great stock of construction supplies and materials.

Notwithstanding the terrific individual weight of their many pieces of equipment—the total of which is in excess of 300 tons—the units can transplant themselves swiftly. An entire battalion can break camp, load all of its equipment and supplies and be rolling to a new site in a period of three hours. The stripped-down companies can get about even more rapidly.

In addition to the aviation engineer regiments and battalions which form the

(*Continued on page* 118)

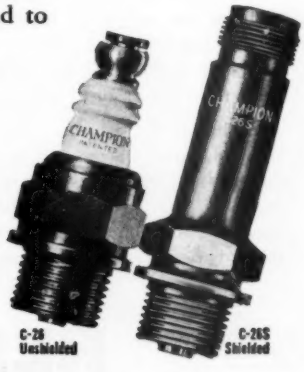
"We should like to express to you our complete satisfaction with the performance of Champion Spark Plugs . . . we were able to obtain the remarkable service of 100 hours between changes . . . they required at least 50% less time to service for re-installation, since they could be cleaned and re-gapped without dismantling and with the simplest of maintenance equipment." *Excerpts from a letter from JOHN E. KEVARI, Superintendent of Maintenance, Southwest Airways Cargo Division.*

OVER 1,000,000 MILES OF FEEDER LINE OPERATION!

Southwest Airways Cargo Division inaugurated an exclusive feeder line service for the ATC just 21 months ago. Its outstanding success, unmarred by accident, and with the safe and speedy delivery of over 2,000,000 pound cargo proves conclusively and dramatically the practicality of true feeder line service.

In this operation Southwest Airways are deserving of credit as genuine pioneers. They have foreshadowed by a million miles plus, the type of short haul operations that will inevitably link thousands of the nation's small towns into a vast network of speedy and sure transportation.

The "ups and downs" of this service, over 2600 route miles per day, totalled 28,000 landings and take offs. Loads consisting of war materials with high priorities, military freight and mail demanded the utmost in dependable service at all times. Champion-Ceramic Spark Plugs played their vital part with conspicuous success as attested to by the above excerpts.



DEPENDABLE

CHAMPION SPARK PLUGS

CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO

INSTALL CHAMPIONS AND FLY WITH CONFIDENCE

Christening the 10,000th Thunderbolt with a "cloud"

10,000 THUNDERBOLTS!

The 10,000th Republic Thunderbolt is on its way to the fighting front. On the day it came off the assembly lines, there was a moment's pause for the "christening," a hearty cheer, and the line started moving again. A small incident, perhaps, in a world at war... but a significant one.

Created to do things no airplane had ever done before, the Thunderbolt has helped our Air Forces solve one tactical problem after another... from long distance bomber escort to dive-bombing and ground strafing. Today, bearing the colors of five United Nations, the Thunderbolt fights on every front and from the remotest outposts.

The Thunderbolt is a complex machine, heavily armed and armored, superpowered, highly supercharged. It weighs more than eight tons. It costs $100,000. It takes 20,000 man-hours to build. It was created and produced in record time in record quantities—10,000 in 27 months—not by a "miracle" but through typical American ingenuity, downright hard work and splendid coöperation by thousands of people—civilian and military.

Republic is proud, naturally, of the technical excellence of the Thunderbolt, of its production record, and of the superlative battle record of the pilots in whose hands it springs to life as a weapon of war.

But Republic is prouder still of the spirit of those Americans who joined hands and brains to build it, and who today press on to new thousands of Thunderbolts... and Victory!

Republic Aviation Corporation, Farmingdale, Long Island, New York, and Evansville, Indiana.

Republic *firsts* in war point to *firsts* in peace

REPUBLIC AVIATION
CORPORATION
Specialists in High-speed, High-altitude Aircraft

There goes the SCREAMIN' MEEMIES

Bud: *Yea—four hours ago she limped in here with No. 3 engine all shot up.*

Jim: *Boy! We sure learned how to get those big babies back in service quick.*

Bud: *'Course, ya gotta hand it to Air Technical Service Command—sending those assemblies way out here.*

Jim: *O sure, but I get the jumps every time I think how we used to work 27 hours straight when we had to change an engine.*

Bud: *Now we just drop in a new assembly—a pipe four-hour job. Maybe we're gettin' good!*

Jim: *Blow it, fat-head. Here comes the Sarge.*

BUY WAR BONDS

Skill and resourcefulness of ground crews, backed by ATSC and Kinner-built piston and cylinder assemblies—complete units that are already run-in and dynamometer tested—have kept many a Flying Fortress and other of our aircraft in fighting trim, ready for any mission.

KINNER MOTORS, INC., Glendale, Calif., U. S. A.

Kinner

1919 • BUILDERS OF DEPENDABLE AIRCRAFT ENGINES FOR A QUARTER CENTURY • 1944

"Billiard" Shape #22

The Flavor of Home

As comfortable as your favorite chair, because each Kaywoodie Pipe is measured and balanced for comfort and ease. Each one is a perfect example of proper proportion and weight-distribution. (Kaywoodies have been selected by numerous Arts and Crafts Exhibits in the U. S., as specimens of fine proportion). So satisfying to hold in your mouth that you'll always welcome it, and pleasing to hand and eye as well. The flavor you draw from a Kaywoodie is just about the pleasantest, most enjoyable you'll ever experience from tobacco.—If you've been unable to find Kaywoodies lately, it's because of great demand by the Armed Forces. We're sure you'll agree that we must serve our fighters first! Kaywoodie Company, New York and London. *630 Fifth Avenue, New York 20, N.Y.*

War Bonds come first

(*Continued from page* 114)

bulk of its numbers, the Command has airborne battalions which have a particular type of light construction equipment that can be transported by air; a signal company; a camouflage battalion which supervises the concealment of facilities and activity at new airdromes; an M. P. company for headquarters security; engineers maintenance companies to assist in the maintenance of equipment, and medical dispensaries. The construction series through which a typical strip goes, and the specifications for each stage are as follows:

1. The first emergency landing strip (ELS), which is "of sufficient length and level surface to enable aircraft in distress to land."

2. Then a refuelling and re-arming strip (RRS) "of sufficient length of level compacted surface for landing and taking off, with adequate marshalling areas for rapid turn-around of aircraft, adequate tracking to insure operations under all summer and autumn conditions." Actually this means a runway 3,600 × 240 feet with 450- × 240-foot overrun at each end. Some strips are built with runways considerably longer for certain types of aircraft.

3. The strip may next be developed for an advanced landing ground (ALG) which requires construction and surfacing of two 300- × 150-foot marshalling areas at each end, and the clearing of approach funnels so as to permit a minimum glide ratio of one to 30. Taxi tracks must also be added and runways surfaced to a 120-foot width.

In the Normandy operations, surfacing at first was done with square mesh, a metal matting of British manufacture, and Hessian, a covering made from burlap impregnated with asphalt that is similar in appearance to tar-paper roofing.

These advance air bases have enabled Ninth Air Force fighter-bombers to take off at early dawn from British bases, bomb and strafe to the limit of their gasoline and ammunition, and then land less than 10 miles from their targets. By basing on these new strips, pilots can make as many as seven or more sorties before time to return to their permanent hangars for a thorough rest and check-up of their aircraft.

One of the most difficult problems to cope with have been the fresh water springs. Sometimes landing strips are in their final stages of completion when a spring suddenly pops up in the center of a runway and the earth becomes muddy and spongy. I saw 30 tractors and a half-dozen prime movers lick such a situation at an advanced air strip within sniper range of the enemy with one afternoon's work.

Within a few hours the ground around the spring was dredged out so that a huge pit surrounded the water spout. Then hundreds of logs were hauled into the pit and anchored together. Dirt was packed firmly around and on top of them. This afforded a "float" as the water itself was drained away in regular drainage pipes and the field was made perfect operationally.

The speed with which any of this work is accomplished is the cause of greatest amazement on the part of enemy troops—it is taken for granted by our own Air Force. It is said that a Ninth Air Force pilot, flying an unarmed Cessna *Brass Hat*, tried to land on the main Cherbourg airport more than a week before the city itself was taken. Asked how he had mistaken that large permanent airdrome for one of the advanced landing grounds, he replied, "I hadn't been in France for two days and those engineers build 'em awful fast, you know." END

Report from Washington

(*Continued from page* 46)

munications systems and air navigation aids, is all the necessary equipment going to be made in the U.S., too? . . . It's going to be a busy month, indeed.

Operational Landmark

Late in September another first of high significance both to the war effort and to peacetime commercial operations was hung up by the 20th Air Force in China. More than 100 *Superfortresses* bombed Manchuria. Every plane which left the ground returned safely. . . . To quote Brig. Gen. Lauris Norstad, 20th's Chief of Staff: "This would be a remarkable record on a bombing mission by planes of any type, and is all the more remarkable when applied to the B-29, which is still relatively experimental and is flying such vast distances. . . . The mission was about as far in miles as from Atlanta, Georgia to the Arctic Circle. . . . For all our planes to return is a tremendous tribute to the plane's engineering, to the skill of the air crews and to the great devotion to duty by the mechanics and servicemen who comprise the ground crews at bases in India and China. . . . This record of no mechanical failures or maintenance problems in what was one of the largest missions we have yet mounted, is an achievement that should make the Japanese just about as unhappy as the pounding their industries received." . . . Another *Superfortress* record was hung up in mid-October when Maj. Gen. Curtis Lemay announced that in their first nine attacks not a single *Superfortress* was shot down by enemy fighters.

Corsair Camera Club

Something new in photography—a K-21 aerial camera mounted in the belly of a *Corsair*—is making history in the Pacific, according to a report we have received from Sgt. Robert W. Harvey, Marine combat correspondent, who hails from Longmeadow, Mass. The K-21 is furnishing a Marine fighter squadron with up-to-the-minute target information for its daily bombing raids on Japan-held islands. . . . The squadron found that regular photo channels could not service them fast enough and set up the *Corsair* camera club, which gives pictorial records an hour after they land from an attack. . . . Mounting and rigging of the camera was

(*Continued on page* 122)

Two miles up - with an ear to the ground

Keeping posted high in the air is one secret of successful flying. The ground keeps track of the plane. The plane knows the weather, the course, and what it's like at the field.

Lear was among the very first to make aircraft radios — had gained an enviable reputation for fine radio and navigation instruments long before the war — was ready when war needs demanded greater and greater technical development.

Some of these developments can't even be mentioned now. They're too secret. Some are in the field of electric aircraft controls. Some will have no use outside of war.

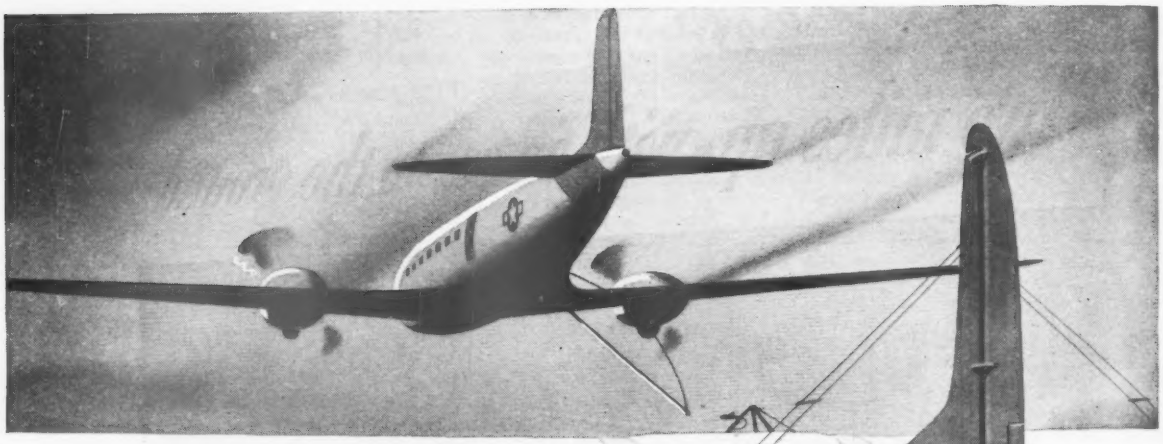
But there are others that hold vast promise for everyone when peace returns.

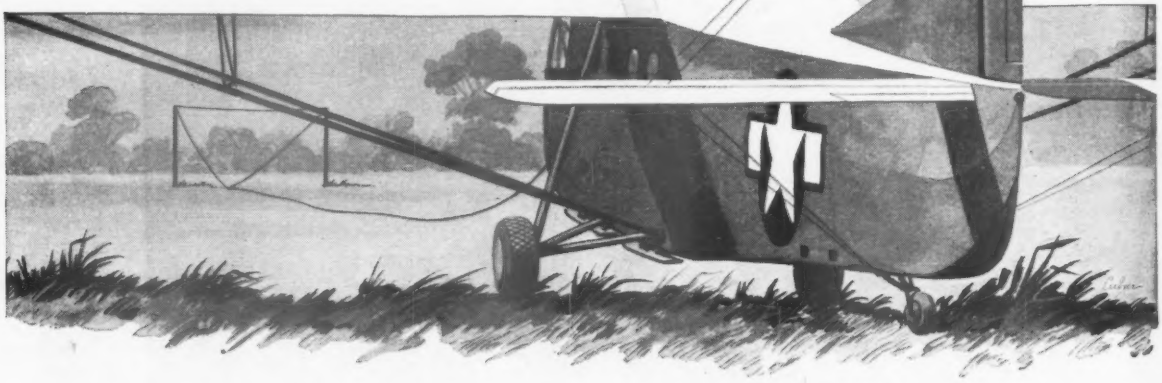
With its war job done, Lear will turn its discoveries, its developments, the resources of its laboratories and plants toward adding new comforts, new conveniences, new pleasures to the lives of America's families.

PLANTS: Piqua, O., and Grand Rapids, Mich. BRANCHES AT: New York, Los Angeles, Chicago, Detroit, Cleveland.

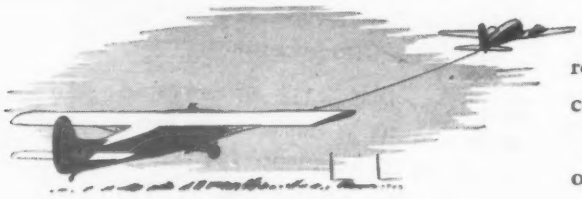
LEAR INCORPORATED
PIQUA · OHIO

Formerly Lear Avia, Inc.





HITCHHIKERS TO HELL—AND BACK!



In four major campaigns encompassing four major theatres—Sicily, Burma, and two in France—airborne infantry in WACO-designed gliders have paced the assault... have literally hitchhiked their way into the hell of battle deep within enemy territory—and back again!

And back again, we say, because the development of a device patterned after the principle employed in air mail pickups now makes it possible for tow planes flying low overhead to retrieve grounded gliders after they have accomplished their missions behind the lines.

Just as these WACO gliders are today getting our fighting forces over there and back again—tomorrow you can rely on WACO's 23 years of experience in aircraft design and manufacture to give you peace-time planes that will always *get you there and back again* with the greatest measure of comfort and convenience. THE WACO AIRCRAFT COMPANY, 412 Peters Avenue, Troy, Ohio, U. S. A.

Waco

WACO AIRPLANES

ALL ARMY CARGO-TRANSPORT GLIDERS ARE WACO DESIGNED

American Airlines' Flagship (Douglas DC-3) serving the Southern Transcontinental Route

General Tire Serves and Salutes the Airlines

One of Continental Airlines' (Denver) fleet of Lockheed Lodestars

National Airlines' ("The Buccaneer Route") Lockheed Lodestar aloft over Miami, Fla.

America's Top-Quality Tire Has Kept Pace with the Fast-Changing Requirements of Air Transport

A vital link in our war effort . . . America knows that the planes and personnel of our airlines have made an invaluable contribution to Victory, maintaining records for safety and performance that call for the highest admiration.

From the very beginning of air transport, General Tire has been privileged to work with the airlines in the development of aircraft tires and allied products that have kept pace with the ever-increasing demands of faster landing speeds, heavier loads and improved runways.

General consistently has supplied products that assure the important factors of long life, soft landings and rugged service . . . with *maximum safety* controlling every step in every improvement.

General Tire pledges its continued cooperation to the airlines in the tremendous future which lies ahead.

AVIATION DIVISION
THE GENERAL TIRE & RUBBER COMPANY
AKRON, OHIO

(*Continued from page* 118)

done on the spot by Capt. Hasell M. Boddy of Henrietta, Tex., the unit's engineering officer, and the squadron photographer, T/S Robert F. Melville of Rochester, N. Y., a former Eastman Kodak technician. . . . Camera is set up inside the fuselage about halfway between wing and tail. A removable panel in the belly seals the opening and at the same time provides ready access for loading and unloading. Camera lens is fixed directly over a sliding door in the center of the panel, with the door rigged so that the pilot can draw it back and secure it in an open position when ready to make his photo run. The shutter is tripped electrically from the cockpit; as an added precaution, a micro-switch keeps the shutter from opening if the sliding door has not been withdrawn from in front of the lens. . . . Speaking of pix, a lone *Lightning* camera plane photographed the Jap mainland as a prelude to the first attack by Boeing's *Superforts* on Japan.

Air Shows

Big things are being planned in the field of post-war air shows by the Personal Aircraft Division of the Aeronautical Chamber of Commerce. The Chamber has in mind shows of the automobile variety —what the industry will offer annually in family planes. . . . Other cities besides New York are mentioned in the tentative plan for show sites—Chicago, Seattle, Fort Worth, Dallas, Denver, San Francisco, Miami, Boston, among others, and a rumor persists that Sted Acker, the air show maestro of Birmingham, is being braced to head the program. . . . . ACCA is silent as this goes to press, because the air show program as now constituted is, paradoxically, in line with Chamber policy to leave post-war problems alone wherever possible until the shooting ceases. The Chamber program now goes no farther than to discourage fly-by-night air show promoters whose efforts could be too diffused and too full of ballyhoo and stunting to suit the industry. . . . Even the most enthusiastic ACCA lightplane boosters will not predict an airshow program before 1946. They point out that to date up, promote, and organize a New York-plus show system will take more than a year if done right. Still further, few lightplane manufacturers—there are about an even dozen who indicate they will be in the field at war's end—expect to have their post-war models ready for mass sales in 1945.

Blind Bombing

When the whole story is told after the war a large share of the credit for the accuracy of British night bombing in recent months may go to an American radio expert. The British for some time have been using a secret navigation device which permits the RAF to hit their targets regardless of weather or visibility, and with remarkably little wastage of bombs. . . . Meantime, from Sweden, comes word that the RAF apparently was using a radar (radio location) navigation device transmitting infra-red rays which pierce fog and cloud. When the rays are reflected from the earth they are recorded on a cathode ray tube, forming a pattern which the navigator can read like a map. . . . Credit for the development goes to Dr. Vladimir K. Zworykin, long connected with cathode ray tube research, who has been associated with Radio Corporation of America since 1930.

the British Say . . .

For the past two years the RAF has been using the American T-1 bombsight. It is known as the Mark XIV by the British, and was first used by RAF Pathfinders in August, 1942. . . . About 137 foreign aircraft have been forced to land on Swedish territory. Of these, 113 made forced landings and 24 crashed or were shot down by Swedish antiaircraft. The great majority of the 137 have been Allied aircraft, *Flying Fortresses* and *Liberators* predominating. . . .

Canadian Vickers, Ltd., Montreal, will build 50 *Merlin*-powered Douglas *Skymasters* for Trans-Canada Airways. . . . The four .30-caliber machine guns in the wings of the Bell *Airacobra* are being replaced by two .50-caliber guns. . . . Dive-bombing Republic *Thunderbolts* based in England usually enter their dive very steeply at 12,000 feet, diving at about 500 m.p.h., then releasing their bombs at 3,000 feet. The *Thunderbolt's* regular electric gun sight is used and a high degree of accuracy is claimed. . . . Nearly 10,000 combat aircraft have been supplied the Russian air force by the U. S. under Lend-Lease since October, 1941. . . . The Northrop company plans to convert its *Black Widow* (P-61) night fighter to a post-war transport by designing a new fuselage for it. . . .

The Consolidated Vultee Model 39 is a development of the U. S. Navy version of the *Liberator*, the PB4Y-2, using the same wings and undercarriage . . .

The now-discarded Boeing B-40 is nicknamed "Flakcruiser," does not carry any bombs, but is armed with 30 machine guns and cannon. Six .50-caliber guns are in the nose, four in a dorsal power turret, and two in the rear dorsal position. Between the trailing edge of the wings and the tail assembly, waist gun positions each mount three .50-caliber guns and a 20-mm. cannon. Ventral gun positions mount four .50's firing forward and four firing downwards. The tail turret has four .50's. . . .

—*Flight*

Briefings

Refreshing candor from Charlie Gale, public-relationing for Luscombe Airplane Corporation: "The post-war plans of Luscombe . . . are in a state of formulation at the present time, as is the case with practically all aircraft manufacturers. . . .

Pointing out that CAA is authorized by law to conduct pilot training but lacks funds, Administrator Theodore P. Wright in his first press conference in his new job, favored activity toward revival of the old CPT program at college level. Asked about private flying, Wright was not pessimistic of post-war prospects but warned that "a great deal must be done by the manufacturers" before a plane is devised that will meet mass-market requirements for utility, safety and price. . . .

Chance Vought's *Corsair* (F4U-1D) has doubled its bomb load, now carrying two 1,000-pounders. . . . From Texas A&M's Dr. Howard W. Barlow, acting dean of engineering, comes word that the college is now giving a two-year course in Aviation Operations Management to train airport and fixed base operations managers. Dr. Barlow says he established the course at the request of the aviation industry. . . .

PCA has signed up for nearly $10,000,000 worth of post-war DC-4's. The big transports will "make a trolley run out of flights between cities 200 miles apart," says President C. Bedell Monro. . . . The Defense Plant Corporation is now referring surplus planes for tests at a special field recently put into operation at Vandalia, Ohio. Tests determine whether the planes released by the Army meet the requirements for civil use established by the CAA. . . . Three classes are specified —planes obtained by the Army from civilian sources, those which comply with the majority of CAA civil requirements but not with all of them, and those which cannot reasonably be changed to comply with CAA civil requirements, such as fighters and bombers, bought on Army specifications and designed for a special fighting job. . . . If the plane weighs more than 5,000 pounds the transport type category test is applied; if it weighs less, the normal tests are applied. . . . CAA engineers check the stress analysis supplied by the manufacturer to the military at the time of purchase, and determine where these specifications differ from civil requirements. This process required considerable detail examination, but the reports from Vandalia are that the work is going forward rapidly. . . .

NX licenses applied for and granted by the Federal Government so far this year total 38, as compared with 23 for the entire year 1943. The "X" stands for experimental—giving an idea of how much effort is being put forth to develop something new in post-war planes. . . . Although CAA knows all about the planes being developed, details are a trade secret. Who is doing the developing is public information and makes interesting reading. Piper Aircraft Corporation, for instance, has four NX's currently, Taylorcraft two, Grumman one, Aeronca two, Budd two, Consolidated Vultee three. Two of these latter are listed under Vultee's Stout Research Division. . . . Six NX numbers have been granted for experimental helicopters to Aeronautical Products at Detroit, Cargoes, Inc., New York; Vultee, Higgins Industries of New Orleans; Hiller Industries of Berkeley, Calif.; and F. Landgraf of Los Angeles. . . . Gliders also come in for much experimental work, notably at the Laister-Kauffmann Aircraft Corporation, St. Louis, where three licenses have been taken out. Six other glider experimentals are also recorded. . . . CAA points out that these licenses do not cover experimental aircraft work being done under Army and Navy auspices, which should, when revealed, swell the total considerably.—FRED HAMLIN.

Here's Automatic Propeller Performance

. . . for your Private Plane of Tomorrow

EXPERIENCED flyers know that for each foot of the four phases of flight—takeoff, climb, cruise, landing—there's an optimum propeller pitch . . . a definite angle at which the propeller knifes into the air with just the right size of bite.

That's what you get automatically every foot of the way with the Aeromatic self-pitching propeller. Completely automatic and self-acting, Aeromatic adjusts to the most advantageous pitch during each second of flight . . . assures you minimum engine wear and fuel consumption, maximum flight performance and flying satisfaction at each stage of flight.

Aeromatic gives you these things automatically, through aerodynamic and centrifugal forces, without controls or instruments. There's no abrupt change from one pitch to another: Aeromatic's change of pitch *flows* rather than "happens" . . . quietly exploiting the laws of aerodynamics for you, rather than bucking them. In use on today's military planes of 100 to 450 HP, Aeromatic will give the private flyer of tomorrow maximum get up . . . go . . . flying efficiency and pleasure. Many of tomorrow's flyers will specify variable-pitch propellers . . . many will insist upon Aeromatic, because *it gives variable-pitch performance automatically*. Engineering and performance data are now available to manufacturers and others. Don't hesitate to write.

For takeoff, with engine at full throttle, Aeromatic assumes low pitch automatically . . . gets plane off ground quickly, using full takeoff power.

For climbing, Aeromatic responds quickly . . . changes pitch automatically as speed increases . . . gets plane to cruising level fast . . . on minimum fuel.

For cruising, Aeromatic automatically maintains the most advantageous pitch . . . assures top cruising performance on minimum fuel consumption at any level.

For landing, Aeromatic adjusts pitch automatically for long, flat glide . . . moves to low pitch instantly for quick pickup if pilot overshoots field.

The Propeller with a Brain for Tomorrow's Plane

Aeromatic

Air Controlled *Automatic Propeller*

Licensed under patents of Everel Propeller Corporation

KOPPERS Company, Bartlett Hayward Division, Baltimore 3, Md.

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Wrench of a thousand uses . . . by PLOMB

Developed to speed aircraft production—⅜" square drive with 12 opening sizes from ⅜" to 1⅜"—it is used with Plomb Hinge Handle and provides innumerable new positions for reaching hard-to-get-at places. Like all tools in the complete Plomb Line, Crowfoot Wrenches are made for better, safer, longer-lasting service. See them at your Plomb Distributor, or write for free catalog—Plomb Tool Company, 2219 Santa Fe Ave., Los Angeles 54, Calif.

Fine Service Tools for All Industries

Oxygen Sense

(Continued from page 49)

and intestines? Here's a gastronomic answer.

Air expands at high altitudes. Air is a gas. The same principles that apply to air expansion apply to gas expansion. So gas expands at high altitudes, whether it's in your body or in a balloon.

At 35,000 feet, for instance, any gas in your stomach or intestines occupies about five times as much space as it does at sea level. **Obviously** the wise thing to do is to avoid anything in the way of food or drink that tends to increase the natural gases already present. There is nothing very dangerous in this gas expansion—unless carried to absurd excess—except severe abdominal cramps and extreme discomfort. These can be relieved by emitting the gas in either direction.

But, wouldn't you consider acute physical discomfort and pain a real danger when you're trying to outmaneuver a Messerschmitt or Zero, or pick off a couple of them with your gun? Wouldn't you consider it dangerous to try solving a tricky navigation problem if you were doubled over with cramps?

3. You got rid of a fairly impolite kerchoo! while you were giving your order. It's bad preparation for high altitude flying, this cold of yours.

For maximum efficiency and maximum safety you must breathe normally. Anything that disrupts normal breathing works against both.

Obviously, a cold interferes with normal breathing. Also, it clogs your sinuses and ear passages, which in high altitude flying must be kept free of any obstructions. You won't find much difficulty with these passages during ascent—it's when you're on the way down that the trouble starts. And, you may find yourself headed straight down!

During descent, air pressure outside your body increases—which means that pressure on your eardrums and sinuses becomes greater. This pressure increase works faster than the interior pressure can change to equalize it. So to keep your ears clear your instructions are to yawn, swallow frequently, or blow your nose with your nostrils pinched together as pressure builds up during the descent. Keep doing it. If your passages are free you'll undoubtedly have no trouble, as the air you are forcing through them by these methods will equalize the outside pressure. But if your passages are clogged, due to a cold you will not be able to force this equalization, and ruptured eardrums or sinus infections may result.

One other thing you can do, if yawning and swallowing is not giving you adequate relief during descent, is to stop that descent for a couple of minutes, climb one or two thousand feet, and then come on back down. This should work.

So when you find yourself going kerchoo report to the flight surgeon as soon as possible. He'll advise you with regard to measures you can take to relieve your

condition if you must fly before your cold can be completely cured.

And this is a good place to correct another popular error. Hyperventilation—forced breathing—is never the answer to lack of oxygen, or lack of air. Whether you're at 5,000 feet or 35,000—breathe normally. Don't knock yourself out trying to breathe more deeply than normal or faster than normal and think you're making up for any deficiency in your breathing apparatus or the atmosphere. If you don't think it's harmful, stand up in your room tonight, and take nothing but deep, exaggerated breaths for a few minutes. If you keep at it here's what you'll get: first, a light-headed feeling; second, a peculiar sensation of faintness and dizziness; third, a characteristic feeling of numbness and tingling of your hands and feet.

Keep it up and you'll get the actual symptoms of collapse. Keep it up longer, if you can, and you will collapse.

So all the time you're flying—but particularly at high altitudes and when you're on oxygen—keep those inhales and exhales at a regular, normal beat.

With men who know tobacco best it's a matter of simple record that excessive

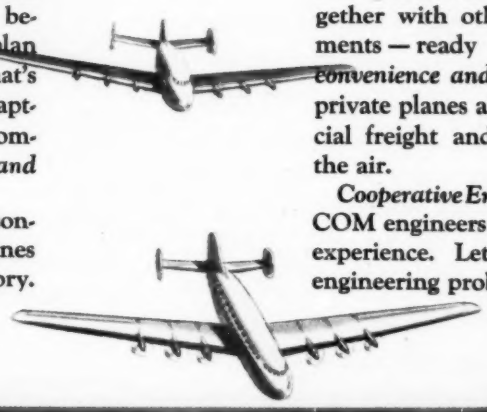
use of it is bad in relation to high altitude flying. This is only natural, of course, in the light of the considerations we've covered thus far. Tobacco fouls up the breathing tubes, tends to aggravate any minor bronchial, nasal or laryngeal irritations, and thus would make breathing itself more difficult. It dries out the nose

(Continued on page 127)

The Greater Safety, Convenience and Economy of Post-War Aviation Must Be Planned **TODAY!**

Today's flight of the imagination will be the commonplace of tomorrow—and we at AIR COMMUNICATIONS believe that *now* is none too soon to plan for the great "Air Age" ahead. That's why AIR-COM engineers are busy adapting the science of electronics to air communications to serve aviation today *and tomorrow.*

Precision-built AIR-COM Products continue to serve America in the warplanes that are blasting open the road to victory.



The war's end will find these tested and proved AIR-COM Products — together with other AIR-COM developments — ready to assure greater *safety, convenience and economy* for all types of private planes and for the giant commercial freight and passenger transports of the air.

Cooperative Engineering Available–AIR-COM engineers have the "know-how" and experience. Let us help you solve your engineering problems of the future.

AIR-COM

PRODUCTS

AIR COMMUNICATIONS, INC.

KANSAS CITY 6, MISSOURI

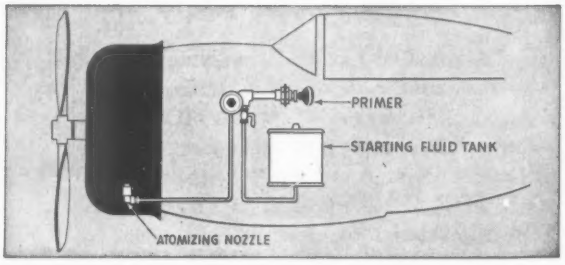
For a hot pilot... frozen by a williwaw

In Alaska, every man who kicks a rudder is a hot pilot—he's got to be. But frost-bound motors keep even the most resourceful flyers grounded—because to start engines when the mercury plummets below zero often takes hours of hard work.

But now, from the laboratories of California Research Corporation, a Standard of California subsidiary, comes revolutionary new Standard Starting Fluid — to kick the coldest engine into life instantly.

Standard Starting Fluid* ignites readily at lowest temperatures — on compression alone, if need be. It is safe for engines, easy to use, sure-fire. The ounce or two needed for each start can be injected through a simple priming system.

The Standard Starting Fluid that helps get aircraft off the ground is another typical example of the kind of creative research which has made Standard Aviation Gasoline and Lubricants supreme in the sky.



**Until after the war, Standard Starting Fluid will be obtainable only in Alaska.*

STANDARD AVIATION PRODUCTS

STANDARD OF CALIFORNIA

(Continued from page 124)

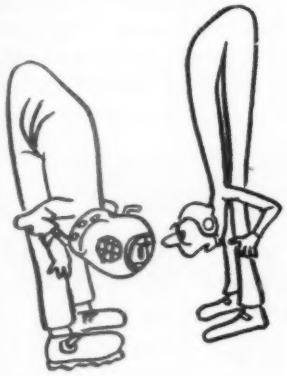
and throat. It increases the pulse rate. It interferes with the function of digestive juices. It prevents proper oxygen absorption by carbon monoxide poisoning in small doses, if inhaled (which it nearly always is).

All this tends to increase nervous instability and tire the mental processes. This does not mean you have to give up smoking. It refers to excess only. If you can't determine for yourself how much smoking constitutes excess, check with the flight surgeon.

Now about that aspirin or any similar product containing acetanilide, phenacetin, or other coal-tar derivatives. Skip them. Skip any coal-tar product and if you're not sure whether any medicine you take is a coal-tar product, or is satisfactory, again check with the flight surgeon. Coal-tar derivatives cause a condition of the blood that prevents oxygen from being readily absorbed—and over a period of time makes you extremely susceptible to the insufficient oxygen of high altitudes.

While you're crossing medicines off your list, draw that line through all the sulpha-group you've read so much about—sulphanilamide, sulphathiazol, sulphapyridine, and the rest. While their action on the skin and mucous membranes has been observed, the main manner in which they are harmful to you as a high altitude flyer is that they impair mental functions—sometimes developing hallucinations.

In all cases, however, remember you're a layman and your fellow flyers are also laymen. Don't rely on your own judgment or theirs when it comes to medical problems. You have easy access to highly trained medical flight personnel. Don't be shy—consult them on all these matters that involve medicines and drugs.



Divers have no priority on "the bends"—you can get all you want—but you don't want any. In aviation medicine the bends are called "aero-embolism" and are defined as the disability arising from bubble formation in the blood stream, caused by reduction of barometric pressure.

Suffice it to say that in your blood are nitrogen, carbon dioxide, water vapor and oxygen—with nitrogen amounting to about four times the total of the other three. When barometric pressure is greatly or quickly reduced (which occurs in climbing to high altitudes) this nitrogen forms gas bubbles which are liberated into the blood stream just as opening a bottle of carbonated water charges it with escaping gas.

This causes pain and discomfort—particularly in joints and muscles, although occasionally there is a feeling of oppression in the middle chest. There also may occur an itching of the skin. Brother, did you ever wear the old-fashioned woolies? If you start to itch under layers of heavy flying clothing how are you going to scratch? And, how are you going to stay in formation, outfight an enemy, sight a gun, or plot a course? Do we have to say more? The pain you get in your muscles and joints is enough in itself to keep you from moving freely or doing your particular job—but throw in that itching and you really have something!

These symptoms often make themselves felt at 28,000 to 30,000 feet, unless you turn on that oxygen supply from the take-off and keep it on all the way up. Remember, it's rapid ascension to high altitude with insufficient oxygen that can give you the bends. So—don't make rapid ascents to high altitudes without sufficient oxygen—which in this case means pure oxygen from your equipment. Breathing oxygen washes out nitrogen from the blood and tissues and decreases the likelihood of "bends."

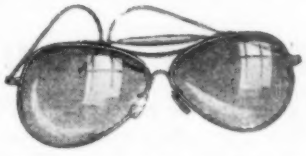
And in conclusion remember this very important point: the foregoing is a definite outline of the various things that can and almost surely will happen if you ignore the basic needs of your body with relation to oxygen. They will not occur if you follow outlined procedures—and you can make your take-offs with no feeling of uncertainty whatsoever. END

Gift shop in a book

Send for this book of Christmas gifts which contains a wealth of merchandise for sportsmen with many articles appealing to men and women who fly.

AIR FORCE PACK $30.00
20% Federal Excise Tax Included

Holds up to three uniforms with two outside zipper pockets. Water-repellent brown or blue duck, bound and reinforced. Initialed free.



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White metal frame with sweat bar. Curved, wide vision green lenses exclude most ultra-violet and infra-red rays. With case.

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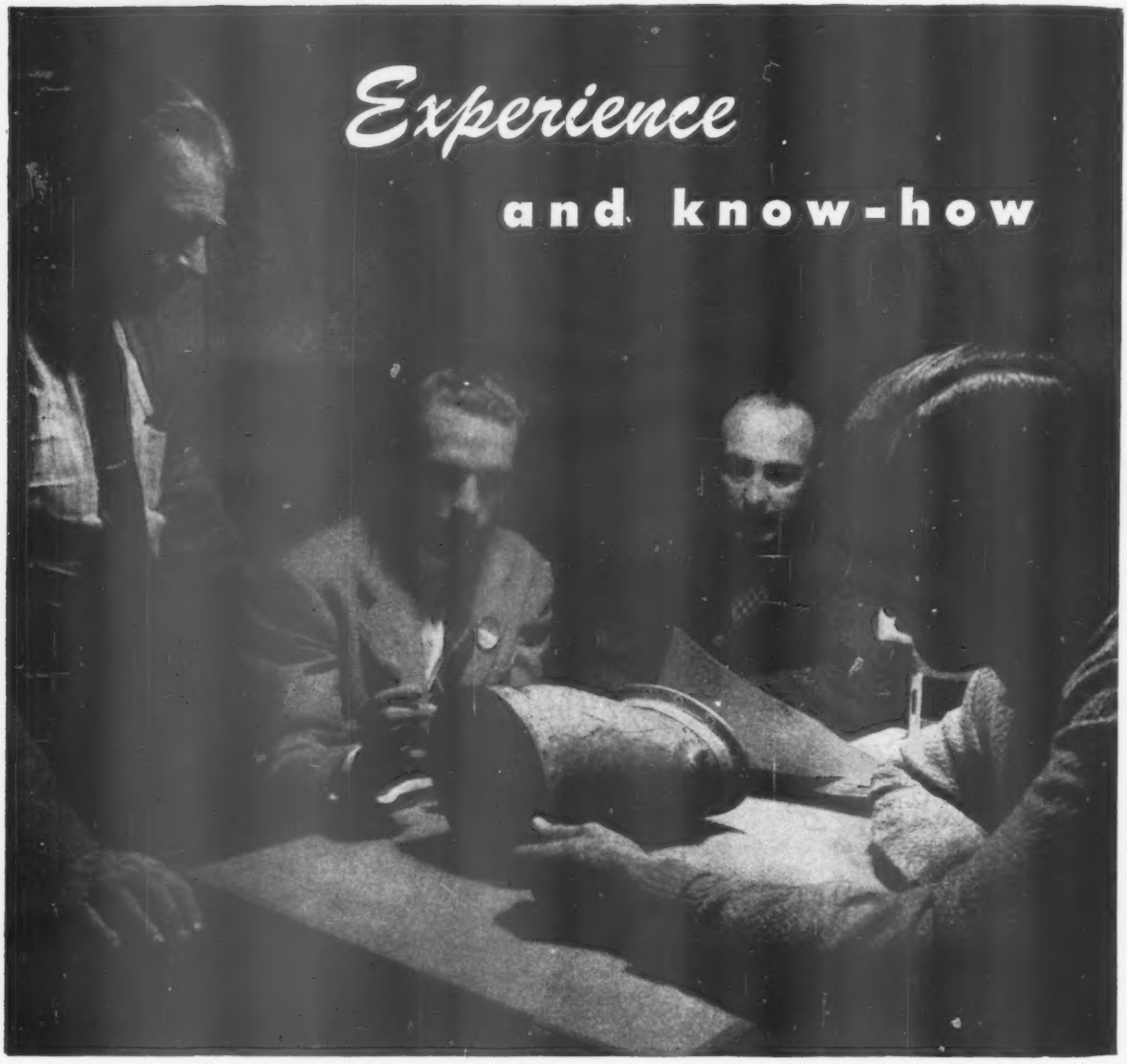

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Solar pioneered the present day airplane exhaust manifold industry... built the first one of stainless steel on a home made drop hammer... fought for its life in the ensuing years... and grew to maturity and leadership during the decade of general business depression before the war.

Leadership in building airplane exhaust systems and other products which must withstand hot gases, acids, heat and corrosion is the course set by Solar for today and for the years to come. Much has been learned about the design and engineering of such products... about the peculiar characteristics of stainless steel and similar alloys which make them difficult to process and fabricate.

Airplane and engine manufacturers are invited to bring to Solar any problems involving the engineering and production of new postwar products of this nature. These are the kind of manufacturing jobs Solar will continue to seek... because they are the tough jobs Solar knows best how to do. Address "Management".

ARMY E NAVY ARMY E NAVY

SOLAR

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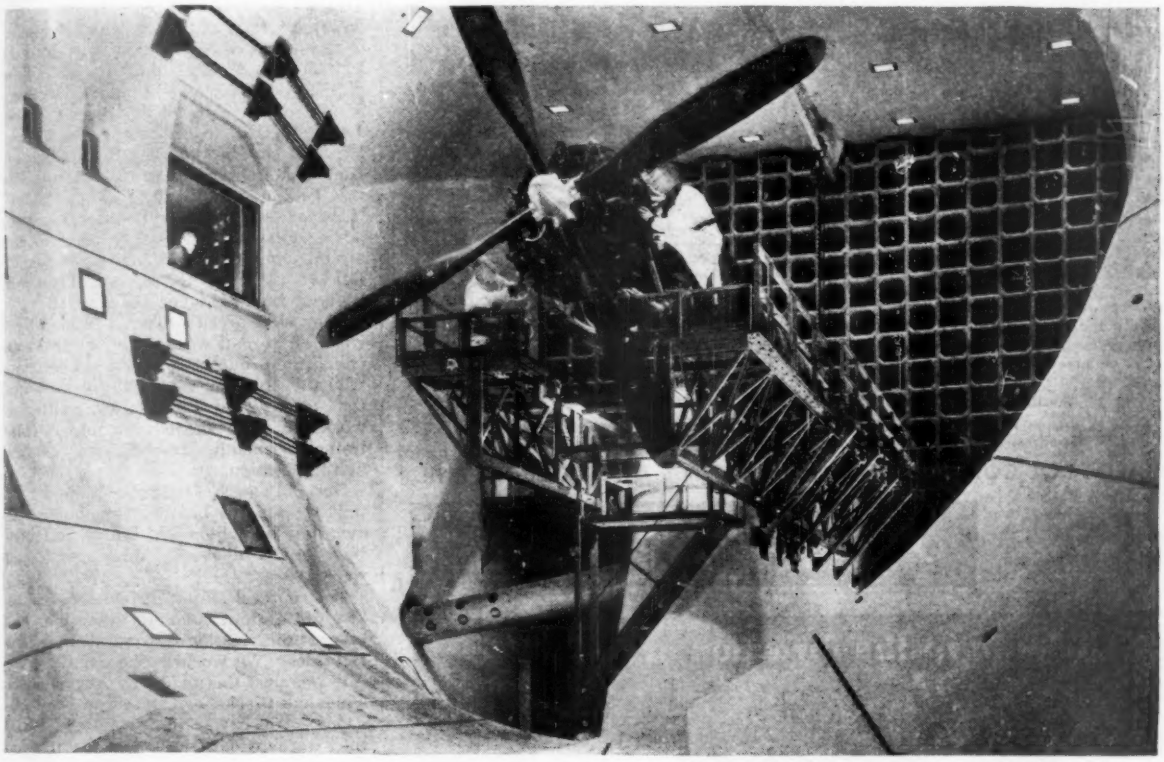
ONLY THE HARD WAY PAYS OFF!... *It's true when you build a new plane—when you train a new flyer—or when you make a new petroleum product—you can start with all the theory and knowledge in the world, but you don't really know what you've got until it meets the test of combat—until it proves out the hard way—when the chips are down! . . .*



Test Cell Curtiss-Wright Corporation, Propeller Division Laboratory

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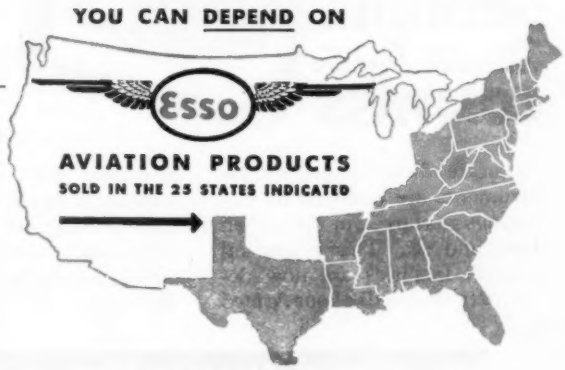

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ARMY E NAVY

Mall PORTABLE POWER TOOLS
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Helping in the Direction of VICTORY

the SHERRILL Magnetic Director COMPASS

BATTLE COMPASSES TODAY!
AUTO AVIATION
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Accurate direction-finding instruments are essential to victorious warfare...in the air, on land and sea. That's why all Sherrill facilities are now devoted to the needs of our Armed Services. But, at war's end, look for a battle-tested line of Sherrill Magnetic Directors incorporating entirely new principles of design—for auto, boat and plane—at popular prices!

SHERRILL RESEARCH CORP., Peru, Indiana

Pappy's Blacksheep

(*Continued from page* 26)

eran Marine aerial officers attribute its success to leadership, determination and willingness. Determination sprang from the Blacksheep members' desire to show the rest of the Marine Corps that "unwanted" men could do as good a job as those more favored, Major Bailey says.

In addition to the nine members who had had a taste of combat, the remainder of the group consisted of Lieuts. John F. Bolt, Robert M. Bragdon, Warren T. Emrich, Don H. Fischer, Denmark Groover, Jr., Edwin A. Harper, William D. Heier, James J. Hill, Christopher L. Magee, Bruce J. Matheson, Henry A. McCartney, Donald J. Moore, Robert W. McClurg, Edwin L. Olander, Virgil G. Ray, Rolland N. Rinabarger, Burney L. Tucker, all replacements who had never been in the air on a mission, and Lieuts. James M. Reames, Medical Corps, and Frank E. Walton, Jr., intelligence officer.

They were given a difficult task. There were eight half-worn-out *Corsairs* with which the group of 26 pilots had to train. And they further were bluntly informed that they would have only a matter of weeks to form themselves into a fully trained, smooth, co-ordinated Marine fighting section.

Normally each section is trained as a unit for months before going out on its own, but Boyington and Bailey perfected their group in exactly three and a half weeks!

"Of course," Major Bailey understates, "we did quite a bit more flying than the other units stationed around the New Hebrides. We worked like dogs."

It was past the middle of August, 1943, when the Blacksheep squadron was activated. And it was on September 12 that they were given their first combat mission—a relatively simple task of flying a security patrol around their base.

The great day came on September 15. That was the day the squadron *really* was born and came into its own.

At no time did the Blacksheep have more than 15 planes to fly. There just weren't any more available, which makes the overall record of VMF-214 even more impressive.

On September 15, these 15 planes, led by Boyington and Bailey, were assigned to escort a flight of *Dauntlesses* and *Avengers* over Ballale, off Kahili on the southern tip of Bougainville, on a bombing mission.

The bombers were hitting the air strip, guarded by the 15 planes flown by the Blacksheep and 10 from another squadron, when nearly 50 Jap *Zeros* attempted to pounce on the bombers.

Despite the disadvantage of being outnumbered two to one, the *Corsair* flyers bore in their attack, scattering the enemy all over the area.

When the last Jap had fled and the fighters had safely returned all the bombers back to their base, it was learned that the Blacksheep fighters themselves had knocked down 14 of the enemy and scored 11 probables.

(*Continued on page* 134)

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(*Continued from page* 130)

In this melee, Boyington had marked up five kills, which brought his total bag to 11. He went on to tie with Maj. Joe Foss, USMC, and Capt. Eddie Rickenbacker, World War I ace, for the then American aerial record of 26 enemy planes shot down in combat. He scored his 26th victory January 3, the day he never came back. That record has since been broken.

During the Blacksheep's first mission, only one man was lost. He was Lieutenant Ewing. No one knows exactly what happened. Ewing was never seen again.

Although they escorted *Liberator* bombers, served as cover for two task forces, searched for missing pilots and strafed barges and light shipping, the 214th did not make contact with the Nip airmen again until September 23. Then they ran into 40 Zeros, shooting down seven without a loss of their own and without a bomber under escort even being hit.

That same afternoon Boyington and Bailey each were leading another plane, out looking for trouble. Skimming along at tree-top level over Vella la Vella, they caught a 100-foot cargo steam launch flat-footed. The "B-B Boys" opened all guns, leaving the steamer aflame, while their two wingmen fanned out and strafed bivouacs.

"We took those Japs so unaware, and they became so excited," Major Bailey relates, "that instead of opening their antiaircraft guns on us, they started firing their big, cumbersome shore batteries! They missed by miles."

On numerous occasions in the next few days, the Blacksheep sighted squadrons of enemy planes twice their own size, but the Japs were wary. Every time they would make a feint as if to attack, the Blacksheep would start to scissor and the Japs would quickly change course.

Before this first tour of the 214th ended on October 20, the squadron had made quite a name for itself. It was along toward the last of the tour that Boyington and some of the others would fly up to 20,000 feet over the enemy air bases and challenge the Japs to come up after them.

In two days' time they knocked down 20 opposing aircraft by this little trick! One of the classic stories concerning Boyington is told about one of these missions. He and Bailey were sitting upstairs at 20,000 feet on one of these particular days when they heard a voice over the radio asking Boyington for his position. Recognizing the voice to be that of a Jap speaking English, but with the inescapable hissing accent, Boyington answered:

"I'm straight up over your head, you lousy ———, but in just about one minute I'm going to be right down there in your short cut hair!"

And in just about that time he and Bailey and the others of their flight were making it miserable by strafing gun positions and troop quarters. They got away without harm to any pilots of their flight.

From October 20 to November 27, the boys were given a routine rest, then sent back into combat. During this second tour of duty, which ended last January 8, the 214th fought over New Ireland, New Britain, Buka, Bougainville and other hot spots. One aerial combat followed another, and their record of enemy planes piled up. In between Ewing and Boyington, 10 other pilots were reported missing in action while six of the remainder received wounds.

The original fierce-fighting, reckless, carefree, determined, VMF-214 is no more. "Pappy" Boyington and those 11 others are gone. Other members are spread throughout training areas and in some of the combat zones.

But today, under the leadership of Maj. Stan Bailey, the Blacksheep have been re-activated. They recently underwent extensive training at the Marine Corps base at Santa Barbara, Calif., flying *Corsairs*.

They have been trained considerably more thoroughly than the original group. There was more time. They realized that training is necessary; that the Marine Corps wants them to become flyers and fighters but that it also wants them to live and to come back to fight another day. But they were just as anxious to get into combat as the original group.

The young men in the new group average between 21 and 22 years of age. One in civilian life was an aircraft riveter, another a stenographer, others were a farm manager, a Lockheed wing assemblyman, a shipping clerk, tool designer, photo finisher, bookkeeper, golf caddy, farm hand, store clerk, lineman, Sears & Roebuck stock boy, freight handler, farmer, draftsman, geophysicist, wholesale candy maker, carpenter, surveyor, laborer and forest ranger. Today they look as though they had never done anything except fly.

One reason for this, Major Bailey explains, is that the Blacksheep squadron is *exclusive*. Once its members considered themselves unwanted outcasts, but now VMF-214 has become a select circle. Every new boy earning his Marine Corps wings hears about the Blacksheep and tries his best to gain appointment to that group.

"There is one prerequisite demanded of every man entering our squadron," says Major Bailey. "He must be a natural lover of a fighter plane and not be wishy-washy about thinking maybe he ought to be flying something else."

When a pilot is directed Major Bailey's way, he is shown into a tiny field office where Bailey and Maj. W. H. McPherson, the executive officer, sit him down and start asking questions. When they decide the new man will fit into the general squadron pattern, he is told the inception of the Blacksheep.

He learns what a tough struggle it was for the unwanteds to get formed, the shortness of their training period and then their record. By that time he usually believes that to become a member of the Blacksheep is one of the greatest accomplishments of military life. END

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A navigator always carried with him a captured Jap diary. He believed it contained telephone numbers and addresses of Tokio belles—until he discovered it was a field ration list.

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Why don't you send for this Quiz today? Just give us your name and address—we'll mail you the Quiz, and later you'll receive our report on all returns, so you can compare your answers with thousands of others. Write us now! ...Bellanca Aircraft Corporation, Dept. S-1, New Castle, Delaware.

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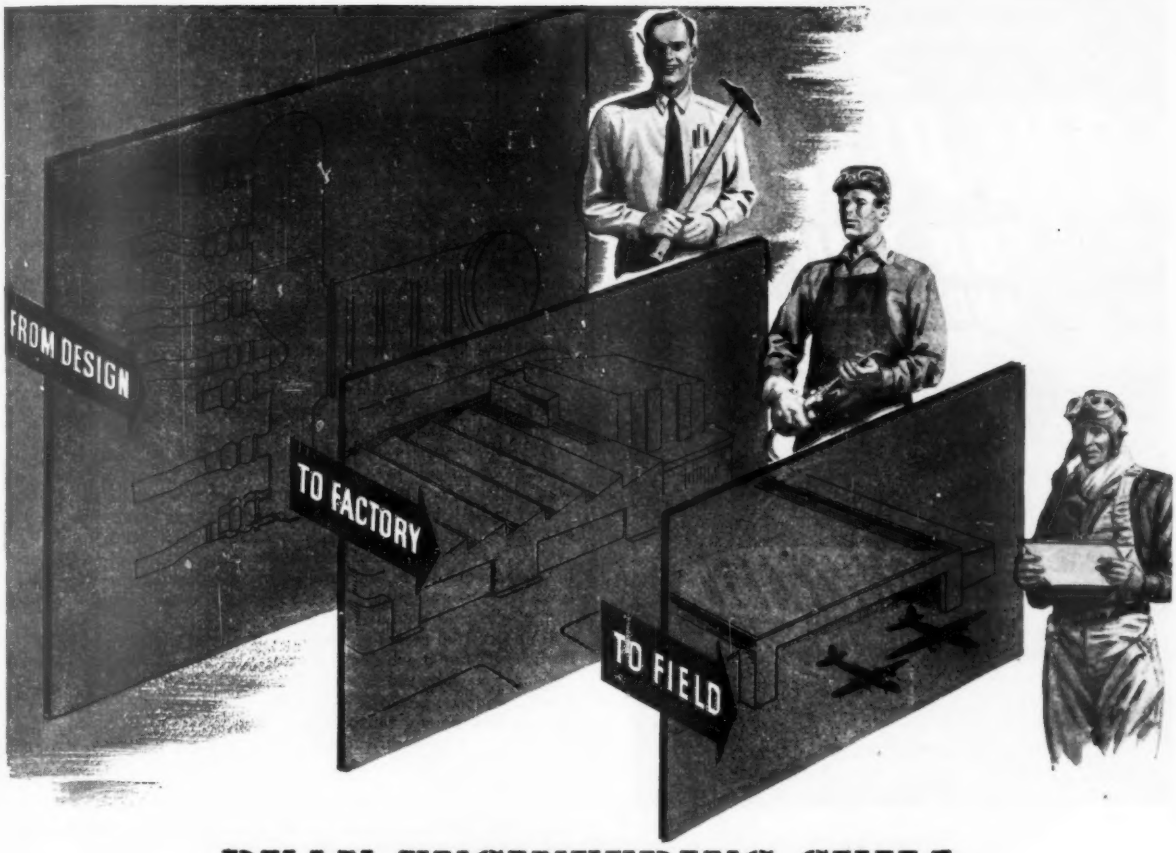

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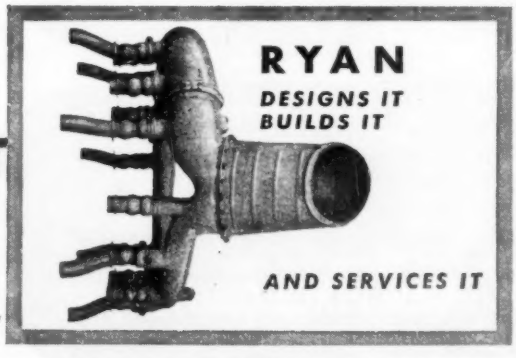

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Make Way for Aircraft Radio

(*Continued from page 47*)

accepted until months later. The way to get around this, however, was to wire in and ask for temporary disposition to use the transmitter—after the application had had time to be received and filed. Permission was granted invariably although the actual license seldom arrived until months later.

The third requirement—relicensing the airplane—plunged the plane owner into the clutches of the CAA.

Any time any equipment is removed or new equipment installed in an "NC" airplane the plane's license is voided. To have it reinstated, a weight and balance formula must be worked out in order to determine the new "moments" of the airplane. This is for the purpose of calculating balance, weight allowance, baggage, passenger capacity, etc.

Too much weight aft, caused by the installation of radio, for instance, will completely alter the baggage weight allowance and sometimes eliminate altogether any baggage being carried in addition to the passengers.

A well-planned radio installation and a properly-designed aircraft radio at the outset will save a great deal of this weight "aft" in the airplane but the balance of the airplane is bound to be altered somewhat, in which case relicensing and a new weight and balance formula must be calculated.

Only a licensed aircraft mechanic can sign a new weight and balance form and, in addition, before the new license is granted, a CAA inspector must approve both the radio installation and the weight and balance as figured.

If no licensed mechanic were available at the time of installation, or if that mechanic were unable to work out the weight and balance formula, a wide search resulting in great expense to the plane owner was necessary. Again, if the plane owner did not live near a fairly large airport or aircraft service center, he would have difficulty finding the CAA inspector in order to have him make the inspection and clear the new license.

The fourth point—the biennial frequency checks required by the FCC—were probably the cause of more bitter feeling towards the whole business of owning an airplane with a two-way radio than anything else.

In order to check the frequencies of an airplane transmitter it is necessary to fly the airplane within range of a frequency monitoring station. There were all too few of these before the war. A good aircraft radio service depot would usually keep a frequency monitoring apparatus running all the time. The airlines also could usually be counted on to help out in a pinch, although their stations, like the radio service depots, were widely scattered and often it took many hours of flying to bring the private owner within range.

Frequency monitoring apparatus must also have been "on" for hours before the checks are made in order for the apparatus to warm up and become frequency-stabilized. It was not unusual to find the *monitoring apparatus* "off frequency," which caused great consternation to the private owner if he were given a report that suddenly showed his transmitter crystals off frequency and thus illegal under FCC regulations. A "nominal" charge was made for these frequency checks—an amount varying from $1 to $3 per crystal. Private owners with multi-frequency transmitters were astounded to find that they were spending $70 to $80 a year for this service in fees alone!

If the private owner were not fore-warned of all these things he could hardly be blamed for growing discouraged. In an effort to inform him, aircraft radio manufacturers usually included a rather massive instruction book with each radio they sold. These books contained service notes and schematic diagrams of the radios themselves, a complete course on "How to Get the Most Out of Your Radio," plus tips for conforming to the laws of the FCC and CAA, with the least amount of pain.

Another requirement, omitted from the previous list, was the annual inspection of the radio installation in the airplane according to FCC regulations. In order to conform to it, the FCC inspector had to be run to earth.

In all our years in the aircraft radio manufacturing business only once did we ever hear of a case where a private owner finally captured an FCC inspector to obtain this annual inspection.

Then the inspector asked one question: "Have you a battery in this airplane?" When shown the battery he seemed com-

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pletely satisfied and the private owner has neither seen the inspector nor heard from the FCC since. This was four years ago.

The advantages of two-way radio are obvious. To be able to receive and fly the beams, get the weather ahead and the winds aloft, and to receive traffic instructions when approaching congested airport areas can only be accomplished successfully by having both transmitter and receiver.

A receiver is better than no radio at all, but often information most urgently needed can not be obtained unless specifically requested through a transmitter.

A transmitter has another advantage in obtaining clearances to take off and land and for filing flight plans. Airways would accept a flight plan filed by radio often eliminating the necessity of climbing many flights of stairs to the traffic control office.

The cross-country pilot's best friend could be his direction-finder. The added comfort and safety of a radio direction finder loop for a private plane cannot be overestimated.

Some of the flight instructors of the old school will argue this point, claiming that it makes a young pilot's navigation sloppy. However, two things must be remembered: (1) radio ground stations are increasing in number and (2) being able to navigate by radio direction finding, in addition to other and more elementary ways (compass, dead reckoning, etc.) makes cross-country flying for the novice much safer. Being lost is a chronic situation for most young flyers and the cause, directly or indirectly, of many accidents. A live novice is better than a dead expert —to coin a new maxim.

Undoubtedly new regulations will be written which will be more in keeping with the prodigious anticipated post-war private flying activity. After the war more than ever there will be a need for radio control of the traffic along the airways and around the congested aerial centers.

Rules and regulations pertaining to aircraft radio will require a considerable amount of altering to cope with the new era of private flying. Licenses of some sort, however, will always be necessary.

In order to make it as easy as possible for the plane owners to obtain their licenses we suggest the following plan:

Aircraft distributors and dealers, airplane and accessory sales and service depots, who will be in the business of catering to private flying, should be equipped to issue some, if not all, of the licenses required by the CAA and FCC. What a boon this would be to the private flyer! For their own sake, dealers and distributors should attempt to give a complete service of this kind.

A notary public would be necessary to issue the third-class radiotelephone operator's license and the same notary public should be authorized to clear the radio station license. The former is only a formality and the latter, once the technical information is filled in, is simplicity itself. All technical information on the radio is furnished by the manufacturer and the process is only a matter of transferring the data on the forms.

The CAA licenses, of course, would require a licensed mechanic versed in the intricacies of figuring out a weight and balance formula. Any dealer, however who aspires to have his establishment become a rendezvous for private flyers would not progress far towards realizing this ambition unless he had at least one mechanic with these qualifications on hand to serve his customers.

Frequency monitoring apparatus should be also part of the service dealer's standard test equipment set-up.

There are four good reasons why the rather exorbitant costs attendant to installing a two-way radio in a privately owned plane will in all probability come a-tumbling. First, there will be enormous quantities of surplus war radio equipment that can be converted for private flying use. Second, private flyer radio equipment will be installed in the planes at the factory, which will cut the installation costs enormously. Third, sheer quantity will reduce the cost of production. Fourth, competition will be keen and high costs have never yet existed in the face of tough competition. END

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Airborne Plagues?

(*Continued from page 29*)

breaks of bubonic plague in ports of the United States in the past, but there have been no authenticated cases of rats getting into this country aboard aircraft. It has occurred in Honolulu, however. As cargo carrying becomes more common and the odor of food attracts rodents, great care in preventing their presence aboard planes as well as stringent inspection and deratization enforcement will have to be exercised.

TYPHUS. Epidemic typhus is spread rapidly by body lice. Inoculation against this disease is variously effective but cannot be relied upon for more than four to six months. It is perhaps the most insidious of possible plane-borne vectors.

MALARIA. This disease has long been present in the United States, but cognizance must be taken of the possibility of the introduction of new strains presenting unfamiliar symptoms and of persons establishing new focuses of infection in areas where the disease has not previously been common. Also, there is the chance that new and unsuspected vectors may be introduced.

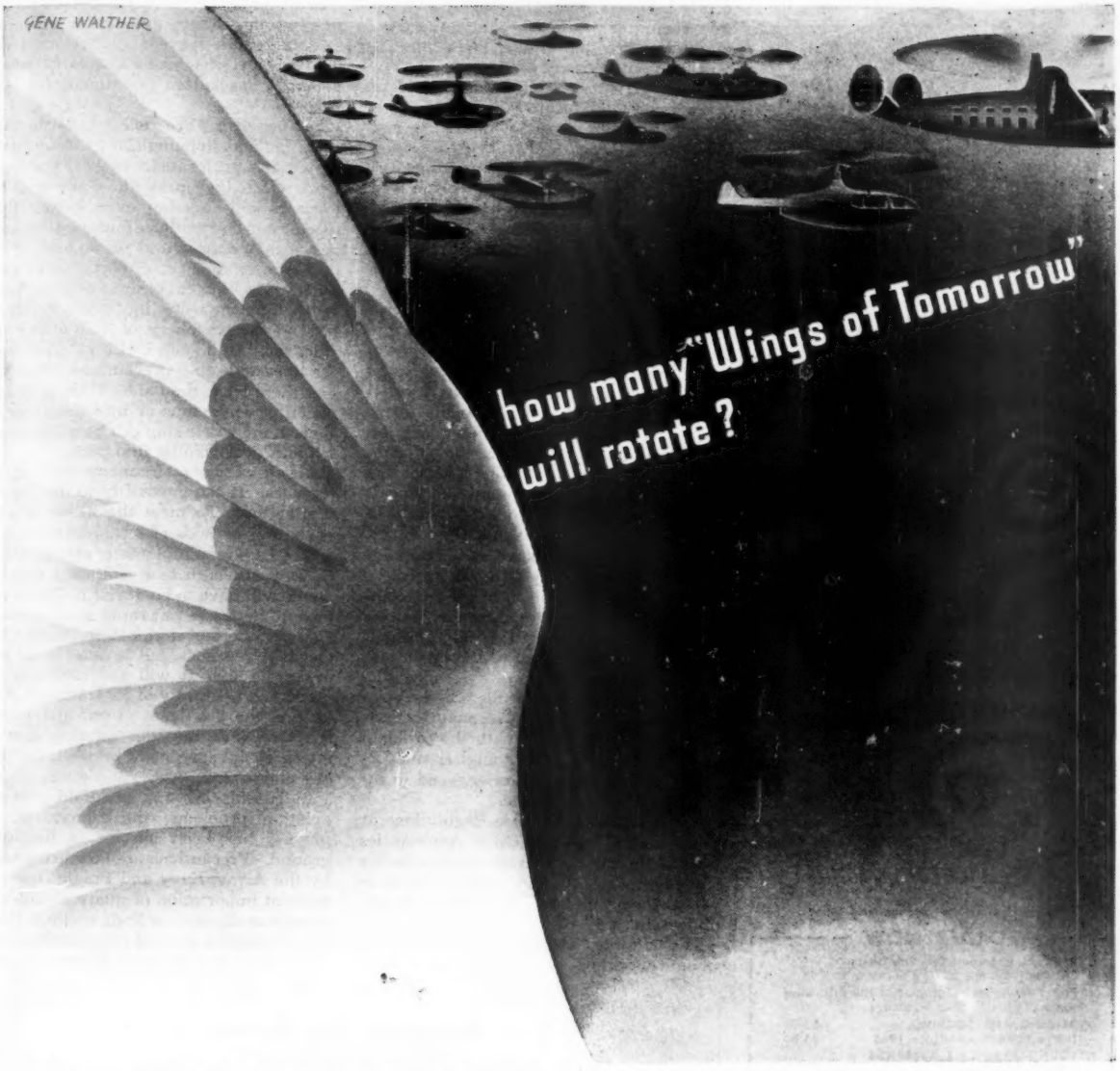
This list does not exhaust the dangerous potentialities of disease importation by swift transport from foreign zones.

One bright hope in the war against airborne plagues is the deadly new insecticide, DDT. At the present time, the Army and Navy are using vast quantities of this new bug-killer in all parts of the world. DDT has proved particularly effective against the body lice responsible for the spreading of typhus, against the mosquito (which should greatly cut down the spread of malaria) and against a vast number of other pests suspected of carrying dangerous diseases, such as the common house fly. Since the adoption of DDT on a large scale, whole insect-ridden areas have been cleaned out by Army and Navy medical men. Now in quantity production, DDT may soon be put to work to prevent airborne plagues.

The Federal Government alone has jurisdiction to formulate agreements with other nations. The machinery which will finally be evolved for the conduct of international aerial transport will have to be the result of a series of compromises with domestic, hemispheric and overseas interests. But there is one item on which every country involved will stand pat on its prerogatives and that is the matter of maintaining its own theory and system of medical inspections. In no other field of international relationships can the most favored nations' clause get us into more delicate situations with other nations.

We can make reciprocal medical examination and inspection agreements with Great Britain, with France and with Holland. But it is doubtful if we would feel safe in so doing with some of the nations whose airports will be necessary.

The Federal Security Administrator re-



The American public, the aviation industry in general and a number of aircraft manufacturers in particular would like a specific answer to this question . . . and we wish that we could give it. This much can be said, however, with but little likelihood of disagreement. At no time in the twenty-odd years since the world witnessed the first practical flight of a rotary wing ship, has professional and public interest in rotary wing flight been as active as at present, *nor has the future of the field been as promising* ★ The Autogiro Company of America has been engaged in rotary wing research and development longer than any other organization in America. Its engineering and research staff; its records of development, experimentation and thousands of hours of flight, and the right to use its numerous inventions, offer incalculable assistance to licensees. We shall be pleased to discuss details of Autogiro Company licensing arrangements with interested aircraft or other manufacturing executives ★ AUTOGIRO COMPANY OF AMERICA, Willow Grove, Pennsylvania.

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cently set up an interdepartment quarantine commission with the duty of examining existing quarantine laws, regulations and enforcement procedures, both at ports of arrival in this country and at foreign ports of departure, including sanitary conditions at ports of departure and of craft en route. It will recommend modification deemed necessary to protect the citizens of the United States and of our military and Naval personnel in other countries against the dangers of introducing quarantinable or other exotic diseases which might threaten military or civilian health.

This commission, composed of representatives of the surgeons general of the Public Health Service, the Army and the Navy, went on tour recently to study the world situation. The Department of Agriculture, interested in the possible introduction into this country of new plant and animal diseases, pests, etc., has a consultant's relationship to the Federal Security Administrator's commission and is active in preventing the introduction of agricultural pests into the United States. The Department of Justice, with its immigration problems, may also come into the picture at times. Liaison has been established between the Public Health Service and the Administrator of Civil Aeronautics for the development of the civil aviation aspects involved.

By the provisions of the Civil Aeronautics Act, the Civil Aeronautics Administration is charged with the problem of medical clearance of domestic and foreign personnel and others engaged in international air commerce.

Part 66 of the Civil Air Regulations as promulgated by the Civil Aeronautics Board concerns foreign air carriers in the United States. It is in skeleton form as yet, however, and will require much amplification.

The Public Health Service has a smooth-working pre-embarkation, shipboard, and landing sanitation and quarantine system. There are, however, inherent differences between surface ships and air transport of persons and cargo which demand specialized treatment of the latter.

Surface ships are deliberate—starting, traveling and stopping slowly. A leisurely system has been satisfactory for the problems which they present. They stop for quarantine inspection even before they reach their destinations, and the slow voyage with the crew and passengers under the eyes of the ships' officers give time for the development of most disease symptoms. Surface ships, moreover, rarely go beyond the periphery of a country—and even then are moored with rat guards on the lines and other precautions which isolate them from the land. If there is suspicion of contagious or infectious disease aboard, the whole ship can be quarantined without ever coming into port.

An air carrier offers many striking differences. It can go swiftly to the desired destination. To meet the needs of such advanced methods of transportation, new and streamlined diplomatic arrangements as well as health and sanitation requirements will have to be devised. There will have to be a safe but rapid medical clearance for the aerial global wayfarer. The machinery exsists, but it must be so well organized that it will not minimize the speed and flexibility of air transport. And, lacking the privileges of extraterritoriality, the work must be administered by international agreement between the various nations.

In considering our manifold post-war aviation problems, the menace of the plagues has been too far in the background. Precautions are now being taken by the Army, Navy and Public Health to prevent importation of quarantinable and infectious diseases or their vectors. On an international scale and in peacetime, however, there will be much to be done. END

Accepted: One Fortress

(Continued from page 52)

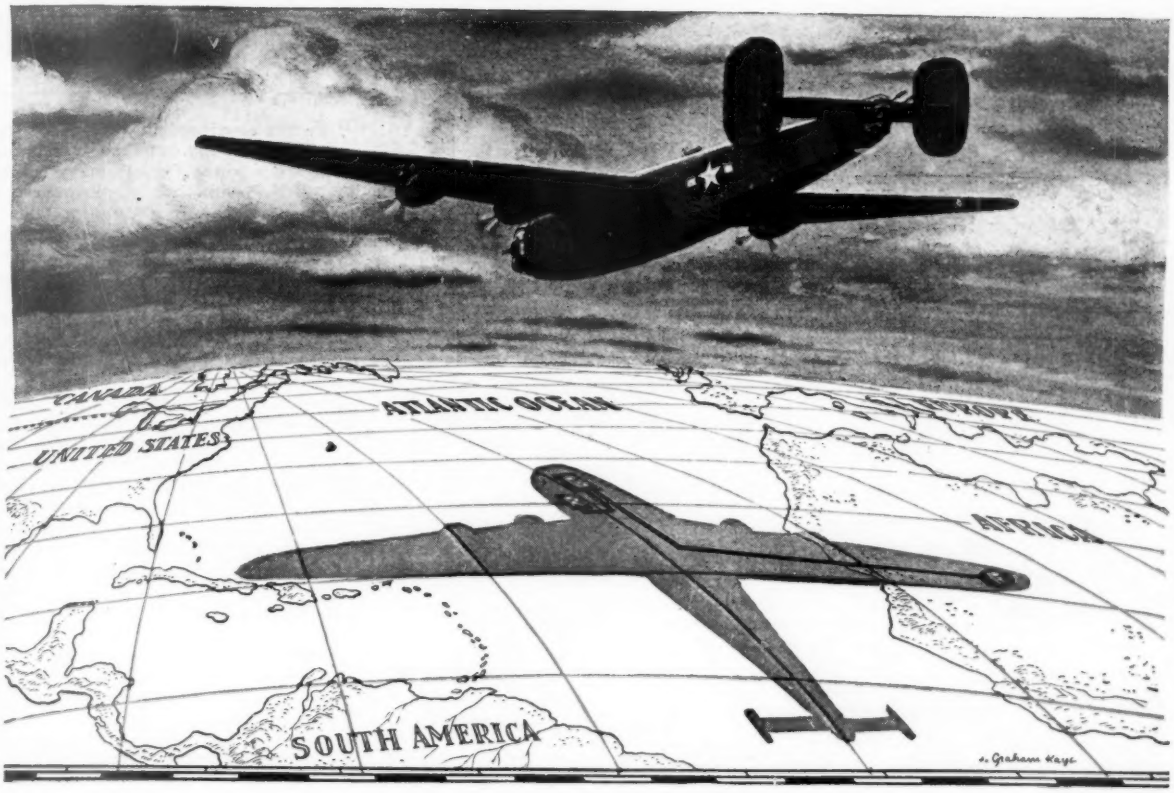
making tests on certain components which can be done only in the air. Meanwhile the radio man takes a couple of shots on some station to see that the radio compass is operating properly.

The final test comes when the pilot approaches for a landing, lets down the wheels. Gracefully, the big plane settles, lands smoothly with tail up. Flying speed lost, the tail drops. The first flight is over. If the plane is "ideal" there are no squawks. Whether or no, the first production flight crew is through. Another *Fort* is ready to be rolled into the stall. As for the job we've just finished, there'll be a final check-over, then the one-hour acceptance flight by the Army.

Since coming to Lockheed, I have made more than 100 first production flights. It might be assumed that, flying in new, untried airplanes, particularly big fellows in which a thousand things could go wrong, that I've had a lot of close calls and thrills.

As a matter of fact I have experienced only two serious mishaps and, strangely enough, they occurred during my first and second flights. On the first, we discovered while landing that the right brake was completely out. With remarkable presence of mind the pilot, seeing that the plane would run off the end of the runway, gave full left brake and right outboard motor. The resultant ground loop was a beautiful thing, with only a scuffed wing to show for it. On the second flight, a wheel collapsed, rolling into a propeller arc which sent it bounding for a hundred yards or so. Since then things have settled down into a production routine marked by nothing more exciting than the usual exigencies of first production flights in such planes.

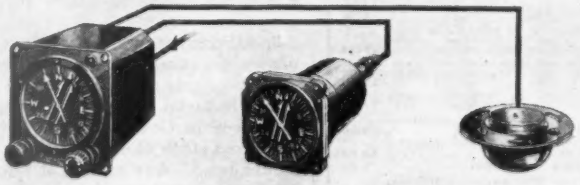
The main feeling you get out of a job like mine is pride. You get a boot out of the co-operative spirit of our crew, the way it works to a common end—to make the best bombers in the world, sound, and solid, and capable of bringing its combat crews back home. END



Sperry Gyrosyn Compass

The Directional Gyro with Magnetic "Sense"

See diagram on shadow of airplane above.



G — **GYROSYN COMPASS** — installed on pilot's instrument panel or at navigator's station.

R — **REPEATER**—for remote indication. Up to six may be used.

F — **FLUX VALVE**—mounted in wing tip. Weighs 20 ounces.

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It combines the functions of both a Directional Gyro and a Magnetic Compass... deadbeat indication, accurate magnetic headings . . . without northerly turning error or resetting.

The GYROSYN Compass is an electrically driven directional gyro precisely controlled by a Flux Valve to indicate magnetic heading directly or through Repeaters.

The Flux Valve is a device for detecting the direction of the earth's magnetic field. Its design provides light weight, hermetic sealing, and small size for rigid mounting in the wing tip. It has no rotating parts.

The GYROSYN Compass weighs only 10 pounds including one Repeater. Provision is made for additional repeaters and for furnishing azimuth stabilization required by any other equipment.

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U.S. Navy Air Corps summer weight helmet, with chin-cup	3.00
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U.S. Navy grey oilskin raincoat, $7.00. Three-piece oilskin set	6.50
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Commando sweaters, 100% soft light-weight wool, medium size only	2.98
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U.S. Army Air Force sheepskin-lined boots, small, medium, large. 11 in. high. No ration stamp necessary	15.00
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U.S. Army Air Force flying mittens, goatskin, sheep-lined, 3 fingers	10.00
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Leather sheepskin lined bombardier type caps	2.50
Aviation mechanic's white coveralls	5.00
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Hip Rubber boots (type D), first quality, medium weight. Apply to your Rationing Board for necessary certificate	7.00
U.S. Army officers' "pink" trousers, all wool, pair	12.00
U.S. Navy Air Corps sheep-lined boots, medium, large, extra large, 11 inches high. No ration stamp necessary	17.00
U.S.N. armpit invader rubber boots, reject, no certificate, small, medium, large	15.00
Airplane cloth, 43 inches wide, good quality	.89
Army and Navy officers' genuine Palm Beach shirts, tan, grey	5.00

Schofield's FLYING EQUIPMENT

Commercial Square East Weymouth 89, Mass.

The Beck Plan

(*Continued from page 27*)

"We are convinced that for every dollar salvaged by indiscriminately dumping such planes on the market, many will be lost in the resultant unemployment and injury to progress in air transportation."

Advocating the creation of a Government-controlled scrap metal stockpile to avert a repetition of the metal shortage existing in the United States early in the war, Mr Beck declared that "unusable planes should be scrapped and held for possible future needs" and that scrap metal not held by the Government "be sold to metal suppliers with the proper Government provisions protecting prices." Excess scrap metal should not be used to destroy markets and no private company should be permitted to make an unfair profit on the transaction, he said.

Mr. Beck listed seven classifications of surplus aircraft equipment:

1. Finished or completed aircraft, in use or usable.
2. Aircraft in various stages of completion.
3. Engines, finished or in process.
4. Sub-assemblies in process.
5. Instruments and accessories, finished and in process.
6. Material in various stages—that is, raw, partially processed, and ready-for-use material.
7. Plants, tools, jigs, dies, etc.

The items in the first two classifications would be divided into the following categories: personnel transport planes; cargo planes; large bombers; medium bombers; pursuit planes; observation and reconnaissance planes; trainers; hedge hoppers.

Operating on the premise that all planes in classifications 1 and 2 have been paid for and that all the engines and items in classifications 3, 4 and 5 have been or should be paid for, Mr. Beck advocated the following successive steps in disposal and reconversion:

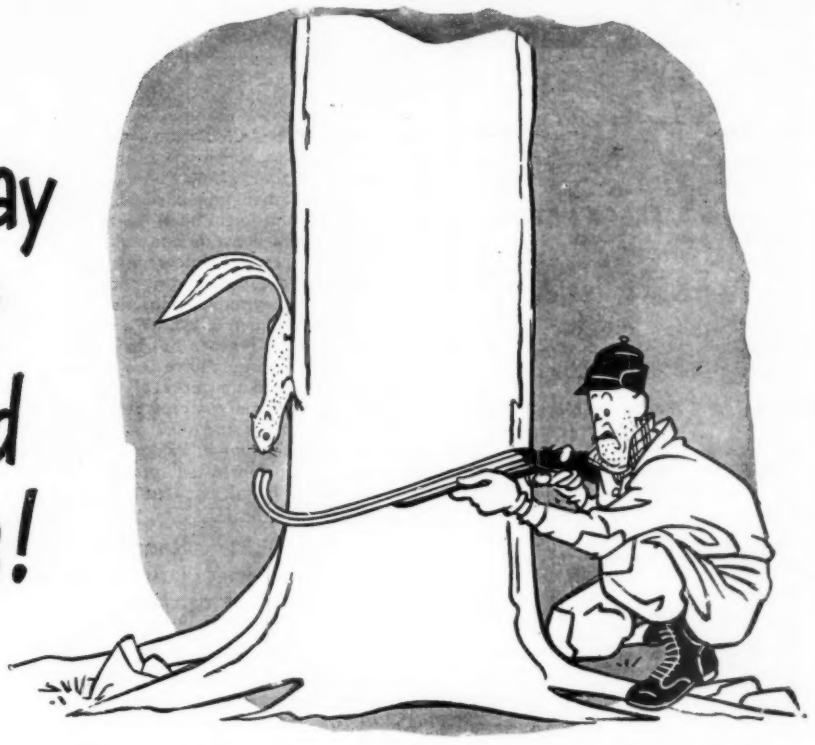
1. The Army, Navy, and Marine Corps shall select, earmark and hold all items falling within classifications 1, 2, 3, 4 and 5 that they deem necessary for security purposes.

2. All combat and non-civilian types of planes not wanted by the armed forces shall promptly be disassembled and reduced to metal scrap. This scrap should be placed in Government-owned natural resources stockpiles and held for possible future need. Any scrap not required by the Government can be sold back to suppliers as previously suggested. Observation and trainer planes, including primary trainers, shall be considered non-civilian.

"It is obvious," said Mr. Beck, "that the foregoing plan for surplus aircraft disposal can be applied with great sales and post-war employment advantage to many other lines of surplus commodities, such as trucks, jeeps, bulldozers, soda fountains, refrigerators, deep-freezers, typewriters and ships."

"Much of this material," he said, "is in foreign countries and areas where the demand for the items is and will be great. If we sell outright, we ruin foreign trade

New way to get around curves!



Revolutionary new design enables Crown Zippers to slide freely around sharp curves—slide faster, smoother!

Today, Crown engineers, working in the field with Air Corps, Ordnance and Quartermaster officers, have developed a zipper that is making history—a zipper that actually slides freely around sharp curves.

Tomorrow, when the last shot has been fired, this great new zipper feature will find many applications in the aviation field—for engine covers, built-in inspection slits that can be zipped open, baggage compartment openings—and for many other vital jobs.

But a Crown Zipper's ability to take curves is only one of many basic advantages it has over ordinary, old-style zippers. (See complete list below.)

That is why Crown Zippers are in action today throughout the world — on airplane gun turrets, armored trucks, tents, sleeping bags and many other military items where human life depends on instant, unfailing action.

Remember, when you turn to post-war: Crown designers will adapt—or, if necessary, *create*—special zipper applications to meet special needs. Remember: you can zip faster, further, more securely, with a Crown Zipper!

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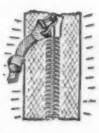

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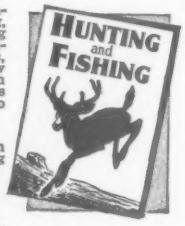

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development on these items—if we give the items, the same effect results.

"Under the foregoing plan the lure or bait for orders for new goods is irresistible—so irresistible that foreign tariffs and quotas will, in many cases, be repealed or abandoned.

"When Germany and Japan shall have surrendered, the United States Government will possess surplus war material that cost more than $75,000,000,000. The disposal of this then unneeded war material presents a problem upon the proper solution of which depends our entire reconversion program. Unless that program provides for stimulating employment of labor by greater industrial production, we shall have failed. We cannot have employment if we do not have production, and we cannot have production if we have depleted the market.

"If this surplus war material were put on the auction block and recklessly sold, incalculable damage might be done to this country. Every fabricated product or every pound of metal sold (unless controlled) would reduce our manufacturing or mining operations to that extent and thereby promote unemployment. Seventy-five billion dollars is at least half of the potential earning power of the American people in any conservative estimate for a post-war year.

"Accordingly, the foregoing plan for disposal of expected military surpluses is suggested. Surplus aircraft are cited for purposes of illustration. Other surplus commodities may be similarly handled.

"The essence of this proposal is that the Government retain for security such quantities as the War Department and the Navy Department think reasonable; and the balance be used to stimulate employment.

"Surpluses of food, clothing and shelter items should be distributed free to peoples in famine areas such as India and China, and in foreign countries devastated by war. This is not a philanthropic gesture—but a measure to help put those countries back on their feet so they again can become customers." END

Requiem for the WASP

(*Continued from page 56*)

job—and well. So much for the WAFS.

Before leaving the subject of cost, however, let me remind you that a single pursuit airplane costs about $100,000. During the past 18 months, until the present writing, the girls ferrying pursuit have had two fatal washouts. On the other hand, during two-thirds of that time (one year), the male squadrons on the base where I was stationed had 62 fatal washouts . . . more than one a week. Even considering the larger number of men ferrying pursuit, computation on the accurate basis of miles flown gives the girls a lower percentage.

Shortly after we first started at Wilmington, Miss Jacqueline Cochran was appointed head of a training school for the girls who were to become the WASP. These girls were to be trained to perform all the routine domestic missions for the USAAF, including ferrying. The WAFS became part of this larger organization—and changed their name to WASP, also.

The training school first required the girls to have 200 hours and a private license. Eventually the entrance hours were lowered to 35 with no license. This became one of the principal gripes of our friends, the CAA pilots. They demanded to know why the girls only had to have 35 hours, when they were required to have 1,000 hours.

To this question, I can only reply with another question: If young men going into flight training with the Army Air Forces are not required to have any previous flight experience, why should the girls have to have 35 hours, when the training is supposedly the same?

Whether the school should have been allowed to train women in wholesale quantities, or whether it should have been started at all, I am not prepared to argue. Personally, I was not particularly in favor of indiscriminate training. However, two years ago we did need pilots desperately. Who knew then that we would be so successful in the European half of our war that we could cut our pilot requirements in half?

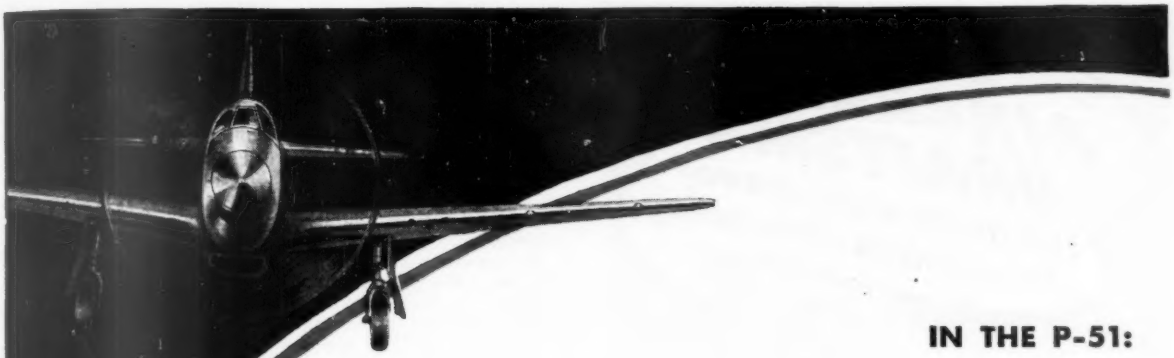
Whatever we think about the school, many of its graduates are undeniably capable. In response to a Congressional representative's statement that the average hours of the CAA pilot number 1,250, I would like to point out that the average hours of at least 600 of the 1,000 existent WASP (some have just finished training) are about 800 to 1,000 hours. Also, that the WASP flying hours represent valuable operational experience in airplanes that are triple the horsepower (at least) of those flown by the men. If we are arguing on the basis of experience and not blind sex prejudice, the foregoing facts should not be ignored.

The entire issue, clouded by a barrage of innuendoes and blurred facts, boils down to an egoistic "battle of the sexes."

Considering the problem from an economic viewpoint, many of the WASP are flying to support their families. Some are the sole mainstay of families because their brothers are overseas; some have husbands killed in action and children to support. One of the main arguments being used against the girls presupposes that male pilots have to have jobs in order to support a family. We seem to forget that one of the tragic penalties of war is the great numbers of women who are left permanently with the financial responsibility of a home.

Conversely, we cannot expect our Army to be run according to the bank account of brother G. I. Admittedly, some of the WASP with no need to work have given up their comfortable living for the more arduous ways of patriotism.

Egoistically speaking, there is little to be said except to remark that sex has little to do with a pilot's capability. Men can snort and rave all they want to about "women pilots" (similar to the average male plaint about "women drivers," only



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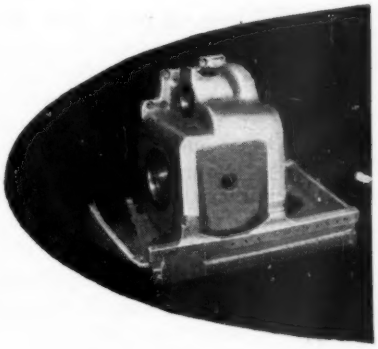
One of these materials is magnesium. Durable, strong Dowmetal Magnesium Alloys, the lightest of all structural metals, contribute substantially to the performance of the P-51, just as they make possible greater speeds and efficiencies in other types of aircraft.



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more malicious), our record in all branches of aviation might be vocally derided—but it can't be *equaled!*

Pursuit aircraft, for instance, are built for persons of small stature. They demand light control touch and quick reaction time. The girls obviously fit into the first two classifications. Quick reaction time is something you're born with, like artistic ability or buck teeth—it has nothing to do with sex. Larger airplanes, requiring more strength in handling, also have mechanically-operated controls. To say nothing of the services of the crew in case of emergency, as required by emergency procedure. Sorry to injure your vanity, gentlemen, but all a good airplane needs to fly it is a good pilot. Planes know no sex.

In response to the inaccurate accusation that there were only five or six WASP in the country capable of being Class 5 pilots. (Class 1 is single engine trainers, Class 2 light twin-engine, Class 3 medium twin-engine, Class 4 pursuit, Class 5 multi-engine), I would like to point out that at least 20 WASP have been checked out as first pilot on multi-engined airplanes and are flying them in line of duty. Two girls that I know of are flying *Superfortresses* as pilot and co-pilot. And, of course, several hundred WASP fly pursuit.

The only reason the girls have not combined the final two classes to become Class 5 pilots (if that means anything), is evidently because they have not been checked out as such.

Why didn't the transition departments advance the girls? Was it because they, like so many other pilots I have heard, believe that the little dears are too delicate to fly airplanes? Ah me, how many crocodile tears have I dried for big, strong pilots lamenting the fate of those poor, frail girls who fly heavy aircraft, endangering their health, endangering their motherhood. Of course, the nurses in the front lines are a different story. When a man needs someone to tie up his wounds, under fire, under the filthiest conditions imaginable, he's pretty grateful for "frail" womanhood. As for the Slav female guerrillas and the Russian women combat pilots, they're made of an entirely different flesh-and-blood composition than our "puny" American girls.

But all the foregoing arguments only complement the dominant theme of this article: Safety. One of the few statistics emanating directly from AAF Headquarters enumerated pilot error percentages a few months ago: .007 per cent for the male pilots, and .001 per cent for the WASP, in ratio. These figures need no further comment.

Of course the WASP have had some accidents and some deaths. A nationally-known columnist recently proclaimed that 25 of the girls had been killed. Where he got his figures from I don't know, possibly he included training deaths from the school. However, for an organization that has been in existence for two years and now numbers around 1,000 pilots, that's a phenomenally low average.

One of the great advantages of militarizing the WASP was that Army assimilation would have brought accident and death protection to them. One girl, for instance, was known to be one of the most capable pilots, male or female, at her California base. She was about 23 years old, a professional pilot with 2,500 hours, the sole support of her family. There was no insurance to take care of that family after she was gone. Another girl was putting her younger sister through school. There was no insurance for either. The WASP received none of the benefits that a WAC, for example, received.

Both accidents were unavoidable and account for two of the nine deaths incurred on ferrying missions. Possibly another four or five can be accounted for in the various other jobs the girls are doing, target-towing, bombardier-piloting, etc. I can only speak for the branch I know, the Ferrying Division. About the ferrying deaths, I know this: two were in pursuit, the rest in smaller aircraft. Considering that there were some 400-odd (progressively) WASP engaged in this type work for the past two years, the accident percentage is practically infinitesimal.

Strangely enough, in view of my heated arguments in favor of the WASP, I have good cause not to like the organization. Although my resignation was "voluntary," I'm out because of a very raw deal indeed. Crowding 2,000 hours, with 10 years of accident-free flying behind me, I find myself on the outside looking in along with all the grumbling CAA pilots.

But my personal feelings have nothing to do with the WASP as a whole. Most of the girls are intelligent, sincere, capable. They have had to buck censure, jealousy, misunderstanding. They have done efficiently and well the most difficult and dangerous job performed by any of the women's organizations. END

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"And then, from this demonstration of perfected techniques, we went to the laboratories, where scientific knowledge and inventive genius must still work with experimental methods to solve problems that have no precedent. Instead of the calm assurance of the big assembly plant, the atmosphere here in these technological maternity wards was one of barely suppressed excitement: hurry, tension, exhilaration, but above all, confidence.

"This was an event to be remembered, because I saw for the first time two of the most spectacular developments in aviation: I saw the Bell helicopter hover and swing under perfect control within reaching distance of the ground, and I had my first glimpse of a jet propulsion plane. The Bell crowd evidently is as adept at design as it is skilled in manufacturing.

"There are many people I know whom I'd like to take through that plant and those laboratories. They would have a better understanding of what modern industry has grown into now that it's really hitting its stride, and what the future offers in aviation progress for our nation's prosperity."

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That Hurricane Flight

(*Continued from page 24*)

tical information on which further light has always been needed is the amount of turbulence inside the storms, and the effect of this turbulence on aircraft flight.

"The Army Air Forces Weather Wing has been operating a hurricane reconnaissance service during the present hurricane season, but to date no report has been received of the airplanes employed in this service actually penetrating into the center of a hurricane.

"On the morning of September 14, 1944, the weather map indicated that a tropical hurricane was off the North Carolina coast and that its projected trajectory was along the Virginia and New Jersey coasts a short distance off shore. Realizing that it might be years before another hurricane came so close to the vicinity of Washington, it was decided to attempt a flight into the outer edges of the storm and, if conditions permitted, to penetrate into the storm until turbulence increased to such severity as to make further penetration inadvisable. Such a flight would certainly give some information on the effect of turbulence on the flight of aircraft within a tropical hurricane."

Across the Potomac River, at Bolling Field, a lone Douglas *Havoc* was being groomed for the daring flight.

Major Wexler was to accompany Colonel Wood. Space for only one other passenger was available, so it was decided to offer it to a forecaster on duty with the forecasting branch of the AAF weather division.

All the forecasters wanted to go, so they drew straws. Winner was Lieut. Frank Record, graduate in meteorology from the Massachusetts Institute of Technology and a graduate of the Institute of Tropical Meteorology at San Juan, Puerto Rico.

As the take-off hour approached, Washington was already under the influence of the disturbance. Low clouds formed a solid overcast. Light to moderate rain was falling. Colonel Wood and his mates were in the operations office, donning flight gear and studying last-minute reports. Then, in the plane, seat belts were tightened and Colonel Wood started the two engines. The time was 1400 hours as he shoved the throttles open and the *Havoc* roared off the slippery runway at Bolling Field and disappeared in a southeasterly direction.

By now the full force of the hurricane was centered at about 50 or 75 miles off Cape Henry. It was moving parallel to the coast in a northeasterly direction, its velocity estimated at from 35 to 40 m.p.h. Winds at Norfolk, Va., at the take-off hour were reported as high as 90 m.p.h.

Colonel Wood climbed the *Havoc* through a thin overcast which had its top at 1,500 feet and flew to a point 30 miles northeast of Langley Field, near Hampton, Va. From this point the three officers could see their goal: a solid, towering wall, jet black and menacing. It was an awesome sight that would have sent the most seasoned pilot wheeling about for home. But not the Wood expedition.

Rain streaked along the cockpit windshield as they approached the dense black wall that lined the western edge of the Chesapeake Bay. In a matter of minutes the sturdy *Havoc*, dwarfed by the gigantic black wall, plunged into almost total darkness. Instantly, it was swallowed up by the boiling atmosphere.

Colonel Wood's report tells what happened:

"The airplane was turned on a heading so as to fly a track that would lead straight toward the estimated position of the center of the hurricane. Altitude was 3,000 feet. A drift correction of 30° was allowed to account for the estimated 100 m.p.h. cross wind encountered at the outer edge of the storm.

"Immediately on entering the outer edge, the atmosphere turned very dark and a blanket of heavy rainfall was encountered. Very surprisingly, a strong but steady down current also was encountered. This phenomenon is contrary to the heretofore generally accepted principle that the outer portion of a hurricane contains ascending rather than descending air. Although visibility was very low, due to the heavy rainfall, there were very few clouds below the altitude of the airplane, except for some scud over Cape Henry, produced by orographical lifting."

To report what was taking place, Major Wexler and Lieutenant Record made what notes they could in their pitching seats. Colonel Wood, who, the day before, had entered his 3,700th hour of military flying in his logbook, concentrated on flying the airplane. He was hauling back on the stick to correct for the indicated descent of 700 feet per minute [normal airline descent, planned for passenger comfort is 300 feet per minute].

Manual control of the *Havoc* was a curious sensation, according to Colonel Wood. The motion of the airplane was the result of three different and distinct motions. First there was the forward speed of the plane (about 300 m.p.h.). Next there was the wind pushing the aircraft sideways—estimated between 100 and 150 m.p.h. Last, there was the vertical motion of the air. The *Havoc* was proving to be a well-stressed airplane.

The rain increased in intensity; sheets of it were rolling off the wing's trailing edge. The air was moderately turbulent, but not as rough as anticipated; Colonel Wood said later that he had flown into thunderheads in which the air was considerably more turbulent.

The waves below were enormous. Once, when the ocean was visible, they flew over three ships that were being completely covered by mountainous waves. A large freighter was seen plowing through the water, being swept from bow to stern by huge waves which at times appeared to engulf it. Spray was being thrown as high as 200 feet into the air. Colonel Wood's report said:

"From the appearance of the sea, both within Chesapeake Bay and east of Cape Henry, it is not surprising that a Navy destroyer of the 1,850-ton class was sunk by the storm." The Navy also announced that two Coast Guard boats and a lightship were lost in the storm with heavy loss of life. As they passed over a Coast Guard boat, Colonel Wood called over the intercom system to Wexler and Record, "I wouldn't be down there for anything." The vessel was only a ship's length from the beach and it was difficult to tell if it had been beached or was still under way.

Colonel Wood's only concern during the 2½-hour flight was about what might happen if one of the engines quit. But both engines functioned smoothly and the *Havoc* behaved beautifully. Survival on that sea would have been problematical.

(*Continued on page 154*)

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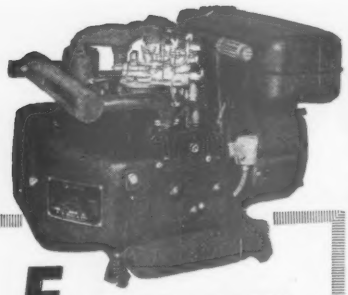

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(Continued from page 150)

Even if he had been able to ditch successfully, Colonel Wood doubted that a Mae West belt or even a life raft would have saved them from drowning.

For 60 miles they bored a hole through the storm before entering the "eye" of the hurricane. At that point an expected but nonetheless strange and eerie phenomenon occurred. The rain slackened to a light mist and, at 5,000 feet, the clouds above cleared and occasional rays of sunshine could be seen. The boiling ocean below remained obscured.

This was an historic moment in meteorological science. These were the first three men to go hunting for the center of a hurricane—and finding it.

In the language of the airman, Colonel Wood's log continues: "The flight was continued on toward the assumed position of the center of the hurricane. Although the downdraft continued to be of considerable strength, very little turbulence was encountered. The airplane lost a speed of about 70 m.p.h. in the necessary climb required to compensate for the downward motion of the air.

"The heavy rain continued. At a point approximately 50 or 60 miles from the outer edge of the storm, we suddenly emerged into an area of rising air. This area also contained fairly dense clouds below, but very thin clouds overhead. The vertical component of the air movement was of such magnitude that the airplane was lifted from the 3,000-foot level to 5,000 feet before power could be reduced and the airplane nosed downward.

"Turbulence in this area also was considerably more severe than in the zone of descending air just passed through, but was not of enough severity to endanger the flight. Although the flight was continued for a few minutes on toward the point where the center was assumed to be, the conditions of flight remained constant—that is, moderate turbulence, rising air, and the sun faintly visible through the thin clouds overhead.

"Presumably, we were off to one side or other of the center, but not finding the exact center and not knowing the direction in which to fly to find the exact center, the airplane was turned around and flown on a track which was estimated would lead toward Norfolk. An altitude of 5,000 feet was maintained on the way out. The dark band of descending air and heavy rainfall was traversed in the reverse order as during the incoming flight. We emerged from the hurricane at a point approximately 30 miles northeast of Norfolk."

Fifteen miles from Washington the weather broke to almost CAVU; Washington missed the full force of the hurricane. Instead, it sped up along the Jersey coast and ravaged Atlantic City and other resort cities, causing millions of dollars of damage as it continued northward to New England.

The flight seemed so routine to him that Colonel Wood was surprised by the public attention it attracted. Back at his desk in The Pentagon, Colonel Wood started on his collaboration on scientific findings with Wexler and Record.

"As a matter of fact," he said, "we brought back some valuable information that will add greatly to the science of flying."

Here are some of his observations:

"Although one of the more important points indicated by our experience during this flight is that hurricanes can very probably be successfully flown through after they have reached temperate latitudes, it should not be accepted as conclusive proof that *all* hurricanes may be flown through." (The italics are Colonel Wood's.)

"Although there have been several instances of flights into hurricanes before they migrated out of the tropical regions, it is not known whether any of these storms were of an intensity that even approached the maximum possible, at the times the flights were made.

"Further, it is not known for certain whether the hurricane that passed along the Virginia coast on the 14th of September is typical of all hurricanes once they reach temperate latitudes. Indications are that this hurricane was about as severe as they ever get to be at these latitudes, but insufficient flying experience in hurricanes has been obtained to determine conclusively that *all* hurricanes in temperate latitudes are safe to fly through.

"Any pilot who, in the future, might desire to repeat this flight is advised that any hurricane should be approached gingerly and with a view toward making an immediate 180° change in his track, should severe turbulence, hail or severe thunderstorm activity be encountered. [Colonel Wood said that on his hurricane flight, no thunderstorm activity of any kind was noted.]

The Wood report concludes as follows:

"It is believed that the method of examining a hurricane by flight reconnaissance that would produce the most revealing results is to attempt an approach to it from the stratosphere. It is thought, further, that such a flight should be made over the outer rim of the hurricane and a let-down into the center or hollow eye of the storm be made with complete safety.

"A record of the temperature at various flight levels while descending through the central (hollow) portion of the storm, together with photographs of the cloud structure, would be of tremendous value to the meteorological scientists in the development of an understanding of hurricane structure."

Colonel Wood, in speaking highly of the H[illegible]c he used, had some advice for the pil[illegible] who finds himself trapped in the path of a hurricane:

"If he has a sturdy plane—like the DC-3, for example—he can weather it." END

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This Administration's Air Policy

(Continued from page 21)

will confine itself to the growing load of air transport. Safety will dictate that its planes, which travel at about the same speed, be sorted out from planes of different speeds and that other airports be placed far enough away to prevent delays and allow for free movement of traffic. Medium-size airports will be needed for sales and charter services, maintenance and overhaul, manufacturing and flight testing, and flight training. Cargo airports may be placed near industrial sections. A number of civil fields may outlie each large city to serve its residential areas.

There is every reason to believe that these suburban airports, or "airparks," will have as profound an effect on American life as the changes brought about by the automobile. The automobile caused a general movement from the center of cities to the periphery. It suburbanized America. The suburban development centered around the community shopping center has become commonplace. The tastefully-landscaped airpark, with facilities for flying, will attract residential building by those who want to live a few bus stops away from the airfield. We may expect a gradual reversal of the trend toward lowered real estate values around these fields which are specially built for private flying. People are growing more accustomed to the sound of planes. Greater safety in flying will eliminate the fear of building near the airport. Concurrent developments may be soundproofed dwellings to keep out some of the noise, and soundproofed propellers to reduce it. These airparks will tend to be farther out of town geographically, but the time-distance into town will not be increased, especially if blighted areas near office blocks are cleared for airstrips in the cities.

Travel and recreation will increase. Recreational areas will become nearer in point of time, and once almost inaccessible wilderness areas can be opened up to the public. This administration is already planning sites for landing fields in the national parks, forests and in primitive areas.

This overall airport plan, if acted upon favorably by a progressive Congress, will go far toward employing and re-employing many of our returning servicemen and war workers who are released from munitions-type employment which cannot be reconverted to peacetime production. Thousands of Seabees and Air Force engineers, who know how to build airstrips and airports under fire, can be put to work at building and improving airports of all types. There will be continued jobs in the airplane plants for manufacturers who can convert from military to civilian planes. There will be thousands of jobs in making, servicing and operating electrical equipment, radio equipment, radar equipment. Thousands, even hundreds of thousands of flying men will want to continue flying after they get back home. Thousands of wartime mechanics will be available to service and repair their planes.

This administration has always been aviation and airport-minded. If you were a traveler on the airlines in the latter half of the 1930's, nine out of 10 airports upon which you stopped had been built or improved by the WPA. This work-relief organization, between 1935 and mid-1940, built 247 new landing fields and improved 317 others. It built 370 miles of new runways and improved 120 miles of existing runways.

Faster and heavier planes were being developed and put into operation at the same time, as there was a broadening demand for air transport in the nation. Longer runways were needed in order to insure space and safety for heavier planes to take off and land. Heavy-duty runways were increasingly needed to take the day-in and day-out shock of landing and the static load of heavy equipment.

WPA project work, in this expanding period of aircraft operation, was important in that it helped our ground equipment to keep pace with the swift strides being made in flying equipment.

It is easy to forget this contribution because it merges quickly into the rapidly passing blur of things left behind. Yet the cold statistical fact is that up to 1940, 250 landing fields were developed or enlarged, including 191 which were regular airline stops. The new airports included La Guardia Field in New York, the airport at Seattle, the Nashville and Albuquerque airports, and a large share of the work on the National Airport at Washington, D. C.

It is easy, during certain open seasons in which we periodically indulge ourselves, to call this "leaf-raking" and "shovel-leaning." It is easy to call names, and forget the facts. Actually, this development helped immeasurably to build up one of our most promising industries and added materially to our capacity for national defense. It developed the country and thereby strengthened it.

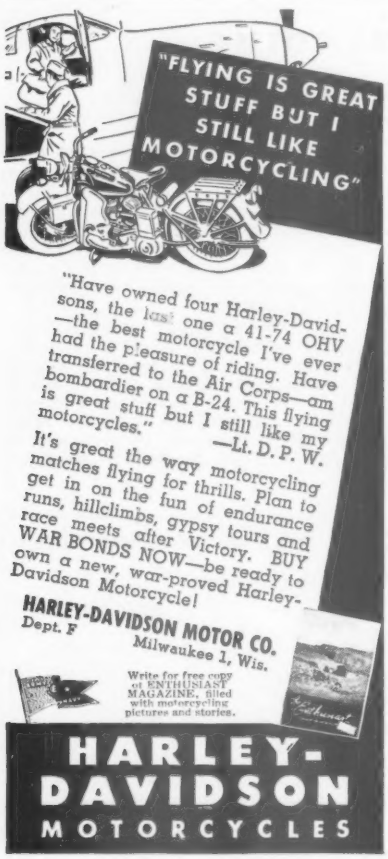
WPA was abolished, as many another Government agency was abolished, when the need for it ceased to exist. Our national activity merged into the defense period, and WPA work on airports was taken over by the Army, the Navy, and the Civil Aeronautics Administration. In the light of new needs for air training and the possible demands of defense of our own country, the program took a new direction. In the three years from 1940 to 1943, 215 new airports were built and 160 were reconditioned. This involved the construction of 900 miles of runways and it demonstrates one of the many ways in which our Government prepared for war.

All this is significant, not alone because it shows how the Government has kept pace with aviation development in times of peace and war, but because it has a bearing on the future. These facilities, now crowded with war traffic, will be there for peace-time use after the shooting stops.

The armed forces, with the help of the commercial airlines, have in the course of this war charted the way for an international air transport that surpasses anything the world has yet seen. It has even surpassed the imagination of fiction writers. Thousands of cargo and transport airplanes have carried hundreds of thousands of tons over thousands of miles of new routes. These planes enabled us to take and hold Guadalcanal; they enabled us to leap-frog the Owen Stanley Mountains and clear the Japs from New Guinea; they kept China in the war with supplies flown over the great hump of the Himalayas; they supplied military operations in North Africa, Burma, Russia, Yugoslavia, France, Belgium, Holland; they evacuated wounded from battle areas, saving lives, amputations, disfigurements; they carried back to America strategic materials necessary to winning the war.

On the basis of these accomplishments, we shall obviously have international air transport after the war. International air transport is today a fact in the United Nations services of supply. It is a fact of such stupendous breadth that it will scarcely be believed when it can be told. The details of peacetime world transport are yet to be worked out, but it is clear that this kind of transport will lace together the great cities of the world in a new pattern when peace comes.

Meantime, our standing air force will undoubtedly remain larger than ever before in peacetime. We will need an active force to carry out the policing missions that will be required of us by the forth-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coming United Nations agreement to put out aggressor fires while they are still small. This air force will be more alert and experimental than ever before—it will keep up with the latest developments, and will create developments of its own. It will be in a constant stand-by condition, a powerful deterrent to any fleet of long-range bombers or salvos of super-robot bombs capable of long flight and pin-point aim.

There will be more of our airmen in the service, with military airfields in addition to the civil fields now existing and planned for future construction.

As to the young men who will come back into civilian life, the war is changing them. Many of them who have gone into aviation will not want to return to their old job in the stockroom or express office. Many of them are so young that they will not have a previous job to return to, and this new promise on the home horizon will offer them a career in a field for which they have been trained. Their experience in getting things done under the harsh conditions of warfare may finish the initial job before we expect. This gigantic movement to prepare us for the air age may seem only a hesitant step after our young men come home. But it is one thing we can do, and we should do it at all costs.

It is one chance we have to make America better for our returning servicemen, instead of merely "keeping it as it was." These men have looked at death for us. Let us turn to them the kindly and smiling face of promise and life. END

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The Hiller-copter

(*Continued from page 57*)

The youth's mechanical skill is not the product of any formal schooling. He has been impatient with orthodox education. He chose not to register for his second year at the University of California.

"I'm afraid not many teachers have interested him," Mrs. Hiller explains. "He has always attended strictly to his work. Even when he was a boy he would always put back together what he took apart."

Sometimes when he was "a boy," he did not always re-assemble the machine he took apart—right away. Once, his mother recalls, he took a small gasoline engine off the washing machine and used it to power his coaster-wagon—until he installed a larger gasoline engine.

Despite his youth, young Hiller is mature beyond his years. He exhibits no signs of self-consciousness as he sits in his panelled office, responds to inter-communicating system calls or handles a Washington long distance call.

He is six feet tall, thin, and energetic. He speaks with reserve until the subject of flying is brought up. Then he becomes enthusiastic. When the conversation is turned to money—he loses interest. A mention of his long, low black roadster will revive his enthusiasm.

When young Hiller decided to build his own helicopter his ambition was to eliminate the tail rotor. He believed it robbed the lifting rotors of too much engine power, estimated at 40 per cent, that otherwise could be used for direct lift. He also decided to eliminate the excessive vibration that he believed existed in the conventional helicopter, increasing the control problem and demanding considerable pilot skill.

As his helicopter experiments developed, he decided to devote his full time to the work. He left Hiller Industries, the die casting concern and the factory continues to operate as one of his father's enterprises.

The helicopter experiments produced a craft with a low slung, tear-drop fuselage whose principal feature is the double rotor mounted on a single, rigid shaft. Powered by a regular airplane engine, the blades revolve simultaneously in opposite directions.

"The entire control of the craft—directional control, its stability control, its descent and ascent control—are operated entirely by the mechanism which operates the speeds and pitches of the rotor blades," Hiller explains.

The pitch of the airfoils may be controlled individually, or in groups of two, or in combination of groups or all integrated into one unit. Such control eliminates the necessity of a tail rotor, required to overcome torque developed by the lifting rotor, and permits use of all engine horsepower for the development of vertical lift.

Specifications and performance figures of the *Hiller-copter* are:

Gross flying weight: 1,400 pounds.
Engine: 90-h.p. Franklin.
Diameter of rotors: 25 feet.
Rotor rpm: 250 at their base.
Maximum distance of direct lift without wind: 38 to 45 feet.
Maximum ceiling at 85 m.p.h. cruising speed, three-quarter throttle: 6,000 feet.
Estimated maximum forward speed: 100 m.p.h.
Cruising range: One hour, 30 minutes.
Span of tricycle landing gear: Nine feet.
Overall length: 12 ft. 6 in.
Height: 8 ft. 4 in.

The outstanding characteristic of his craft, Hiller believes, is the simplicity of its controls which Kaiser learned to operate with sufficient skill to solo 10 feet in the air on his first flight after five minutes verbal instruction.

Manipulation of four control devices is required to fly the *Hiller-copter*. One is the engine throttle. The other three operate the patented rotor speed and pitch control mechanism that is hidden under canvas coverings during public flights.

The first, similar to the rudder pedals of a conventional airplane and moved with the feet, turns the craft to the left or right about its own axis but does not influence its forward or backward motion.

The second, similar to the stick or elevator and aileron control of a conventional airplane, controls the direction of the craft and is manipulated to turn its flight path to the left or right.

The third control, a lever placed low on the pilot's right side, governs the rate of ascent or descent.

The degree of control co-ordination required for efficient operation of a conventional airplane is not required for the flying the *Hiller-copter*, its inventor says. Vibration has been eliminated to the point where the pilot may fly the craft "hands off" for periods ranging up to 60 seconds, depending on the gustiness of the wind which sways it from "straight and level" flight.

The technique for take-off and flight, developed by Hiller, required that—

The craft is headed into the wind.

The vertical motion lever is set for a pre-determined rate of climb.

The engine throttle is opened, increasing the engine r.p.m. and the rotor r.p.m.

Rate of vertical ascent is maintained until the craft has climbed above the area of turbulence set up by the "prop wash" bouncing from the ground. Corrections to maintain position, influenced by the wind, are made individually as required or in co-ordinated movements of the controls.

When the craft has climbed sufficiently, it is nosed downward by forward movement of the stick. The combination of forces generated by gravity and the vertical lift result in forward movement.

Landing on a spot is virtually the reverse of the take-off procedure, accomplished through descent control, throttle manipulation, and forward and lateral control maintained with the rudder and stick.

An engine failure in flight will result in the rotors wind-milling, easing the craft

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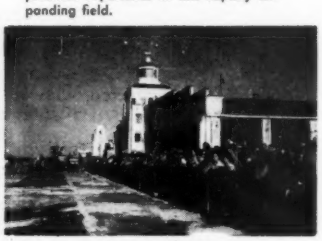

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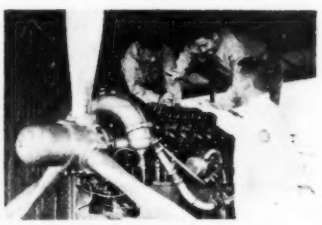

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to the ground as though it were an autogiro. A rotor failure or breakage would be as rare as an airplane wing breaking in flight, Hiller says.

Kaiser has employed Hiller to develop the craft. The first objective will be construction of a *Hiller-copter* that is reported to interest the Navy—a four-place helicopter that could be used for rescue work, scouting, signaling, and other assignments where terrain conditions prohibit the operation of a conventional airplane.

Details of the arrangement between the young inventor and Kaiser have not been disclosed. Their joint activity is construction of a factory in Berkeley, indicating they intend to build more than one helicopter and, probably, are hopeful of perfecting the craft as a post-war product adaptable to mass production—and mass sales.

Kaiser is interested in any product that he is convinced has a possible post-war use. He has advocated a large scale personal airport construction program and his light-metal factories might supply the material needed for construction of the all-metal *Hiller-copter*.

Hiller believes his craft can be mass produced and sold during peace time in the price range of conventional aircraft of comparable horsepower. Its advantages, he believes, will be elimination of high dual instruction costs, hangar rents, and transportation to and from airports.

In the models he would offer in a peacetime market, he would include a device to transfer the engine power from the rotors, which can be locked in a position parallel to the length of the *Hiller-copter*, to the wheels of the landing gear when the craft is on the ground.

"As an automobile," he predicts, "it will do 35 to 40 miles an hour—fast enough for anyone to drive from the neighborhood helicopter landing lot to his home. Its size will permit it to be parked in an ordinary garage." END

15 YEARS AGO

FROM the December, 1929, issue of this magazine:

Gen. William ("Billy") Mitchell pointed out that aviation was split between the various Government departments and constituted, in most cases, a neglected auxiliary of the department to which it was attached. His article "America Trails in World Aeronautics" outlined the growing independence of air force departments in foreign governments and warned that "with no definite aeronautical policy in the United States, no department of aeronautics and no continued technical developments, we are tremendously handicapped when we have to compete with other nations. . . . Practically nothing is being done by our Government to develop better flying machines, better safety devices, or to push our commercial air power throughout the world."

Attacking the movement that was already on foot to increase Government regulation of aviation, Edwin G. Thompson, president of the Thompson Aeronautical Corporation, said that "passage of a law granting exclusive control of air operation would be extremely unwise at this stage in the development of aviation no matter what body is assigned the authority to execute such powers."

And William B. Ziff, editor and publisher of FLYING, warned editorially that "lack of public confidence in aviation and its various phases is alarming. It is ample evidence that the sales methods adopted are entirely inadequate. It is the inevitable result of the exclusive caste and playboy feeling, the innate resentment against the inclusion of all outsiders, which has too long guided those in charge of selling the industry to the public." END

British Super Transport

(*Continued from page 45*)

Range—3,450 miles against 50 m.p.h. wind at 350 m.p.h. at 15,000 feet.

The basic design may be adapted to cover any one of three versions: the long range version, having a practical range of 3,450 miles, allowing for a head wind of 50 m.p.h., cruising speed 350 m.p.h.; the medium range version having a practical range of 2,000 to 2,500 miles; and a short range service version with an operational range of 1,100 miles.

The unique manner in which the fuselage merges into the wing is an essential feature of the "X" layout. It enhances aerodynamic efficiency and provides a greater space for accommodating passengers and freight than is possible in orthodox aircraft of similar size. The volume of the cabin is more than 6,000 cubic feet.

The full size "X" will be of all-metal construction with special attention to external finish.

Another advanced feature of the design, improving overall aerodynamic efficiency, is the housing of the eight engines, gear boxes, radiators, oil coolers, exhaust fans, and ducts completely within the wing.

To insure that the strength of the wing is not impaired by the presence of these removable panels, a specially designed stress-carrying panel will be employed by the builder.

The flaps are of the Miles patented extensible type. This type of flap has been tested on actual flight trials. It has been found possible to achieve a maximum lift coefficient of more than three, without adverse effects on longitudinal control.

A POSTWAR PLAN
for G. I. Joe

A MESSAGE TO MOTHERS AND FATHERS OF SERVICEMEN

Returning servicemen and women have a ready-made postwar plan in the "G. I. Bill of Rights" which recently passed Congress. Among its many provisions are such awards to veterans of World War II as tuition for vocational training plus a government guarantee on loans to enter or purchase a business. It is a *guarantee* of *opportunity.*

Knowing that after the war aviation will provide opportunities which will even surpass those offered by the automotive and radio industries after the last war, your sons and daughters in the service will be exceedingly interested in studying the career opportunities in aviation. California Flyers' School of Aeronautics has a limited number of pre-Pearl Harbor catalogs which factually describe various divisions of aviation, the opportunities, the training, and educational background necessary. Although it is obsolete in minor respect, the book is one that every young person considering a career will want. *It's free. There is no obligation.*

California Flyers, which is one of the nation's leading aviation schools, will accept no enrollments or deposits at this time. This famous school has completed an intensive training program for the U. S. Army Air Corps and today is entirely engaged in an important aviation project. Till the war is won, California Flyers must say, *"Sorry, no enrollments accepted."* But in the meanwhile, brand new *postwar aviation courses* which will meet *postwar aviation problems* are being created, and they will be well worth waiting for!

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In the layout of the pilots' cabin, the two main objectives have been perfection of view and simplicity of control. The range of view is unequalled in any other type of aircraft, the Miles people say. In addition, the instruments have been limited to the normal blind-flying panel, the beam approach instruments, two compasses and an outside-air thermometer.

The engine and fuel controls, instruments and the undercarriage control are in charge of the flight engineer and are conveniently grouped at his station. The pilots are provided with two master throttles and the flap control in addition to the normal flying controls.

The two civil types contemplated are a long-range aircraft with a range of 3,450 miles against a headwind of 50 m.p.h. and accommodation for 50 passengers; and a medium range machine having a range of 2,100 miles against a headwind of 50 m.p.h. and with accommodation for 100 passengers. Both airplanes are designed for operation at any height from 8,000 to 22,000 feet.

Luxurious passenger accommodations are to be provided. This is made possible by the exceptionally large volume available in the cabin and by the attention which will be given to pressurizing, sound-proofing, air-conditioning and lighting. The cabin is to be 16 feet wide and 8 feet high. Conditioned air will be admitted at the rate of 17 cubic feet per minute per person. A constant supply of fresh air can be admitted to the freight compartment to protect perishable goods. All fuel will be carried in the wings and smoking can be permitted anywhere in the cabin.

A number of alternative seating arrangements are possible. In one version of the long-range type, three cabins are provided. One medium-range version arranges the seats in two rows of three on either side of a central gangway about 60 feet long. Flexibility is the keynote in this design.

By dividing the main air routes into legs, the two different versions could conveniently cover the world and stay within their respective ranges of 3,450 and 2,100 miles. Based in the United Kingdom, flights could be made in less than ten hours to such ports as Buenos Aires, Bathurst, Cairo, Khartoum, Lagos, Montreal and New York.

Preliminary arrangements have been made for the three versions of the "X" to be converted into bombers. After allowing the usual fuel reserve of 25 per cent, the ranges of the three types would be 1,100, 2,200 and 3,400 miles respectively, the corresponding bomb loads being 26.9 tons, 17.3 tons and 6.5 tons.

The civil freighter version of the "X" is, like its service counterpart, also designed for short, medium and long range categories. Apart from its exceptional load-carrying capacity, the large unobstructed space available in the fuselage would permit carriage of large and bulky freight which could not possibly be accommodated in any orthodox plane. It has a crew of four with a disposable load of 87,480 pounds—the largest of any of the planes of this type with the same all-up weight as the others. The range of the three types against a 50-m.p.h. headwind is 3,450, 2,100 and 1,000 miles with a payload of 28,900, 49,800 and 68,000 pounds respectively.

The three troop-carrying versions of the "X." similar to the civil freighters, are adapted for the transportation of a large variety of service equipment ranging from 150 fully armed troops to four light tanks with their crews. In the paratroop version, six exits would be provided; two in each side of the fuselage and two in the floor.

With such a variety of applications from one main design, the "X" offers great possibilities for large scale production. The difference in the disposable load in all versions of both the civil and military models is the only major variation in all types, since the same all-up weight of 165,000 pounds applies to the entire fleet.

American designers who are prone to envisage entirely different types of basic designs for long, medium, and short haul cargo planes and still more designs for long, medium and short haul passenger planes might do well to study the revolutionary possibilities in the Miles "X." American techniques of mass production might have much to gain from the Miles principle of design standardization. END

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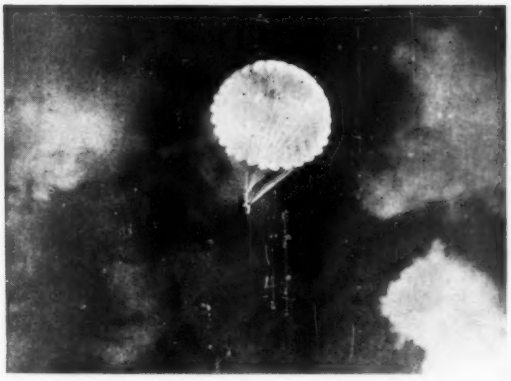

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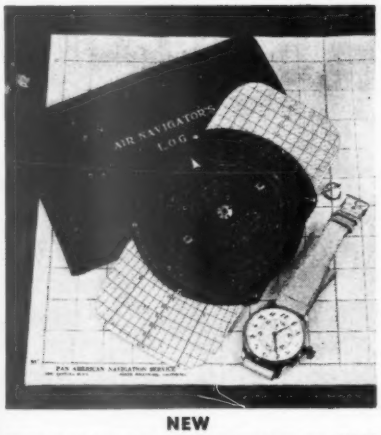

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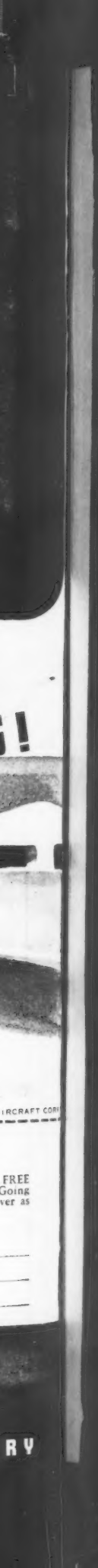
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